Customer Care Solutions
RH-20 Series Transceivers

Troubleshooting Instructions

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RF Troubleshooting

Introduction to RF troubleshooting

Measurements should be done using Spectrum analyzer with high-frequency high-impedance passive probe (LO-/reference frequencies and RF power levels) and Oscilloscope with a 10:1 probe (DC-voltages and low frequency signals).

The RF-section is build around one RF-ASIC (HELGO N500). For easier troubleshooting, this RF troubleshooting document is divided into sections.

Before changing HELGO, please check the following things: supply voltages are OK and serial communication coming from baseband to HELGO.

Please note that the grounding of the PA module is directly below PA-module so it is difficult to check or change. **Most RF semiconductors are static discharge sensitive!** So ESD protection must be taken care of duriong repair (ground straps and ESD soldering irons). HELGO and PA are moisture sensitive so parts must be pre-baked prior to soldering.

Apart from key components described in this document here are a lot of discrete components (resistors, inductors and capacitors) which troubleshooting is done by checking if soldering of the component is done properly (for factory repairs checking if it is missing from PWB). Capacitor can be checked for shortening and resistors for value by means of an ohmmeter, but be aware in-circuit measurements should be evaluated carefully.

Please be aware that all measured voltages or RF levels in this document are rough figures. Especially RF levels varies due to different measuring equipment or different grounding of the used probe. When using RF probe usually a good way is to use metallic tweezers to connect probe ground to PWB ground as close to measurement point as possible.

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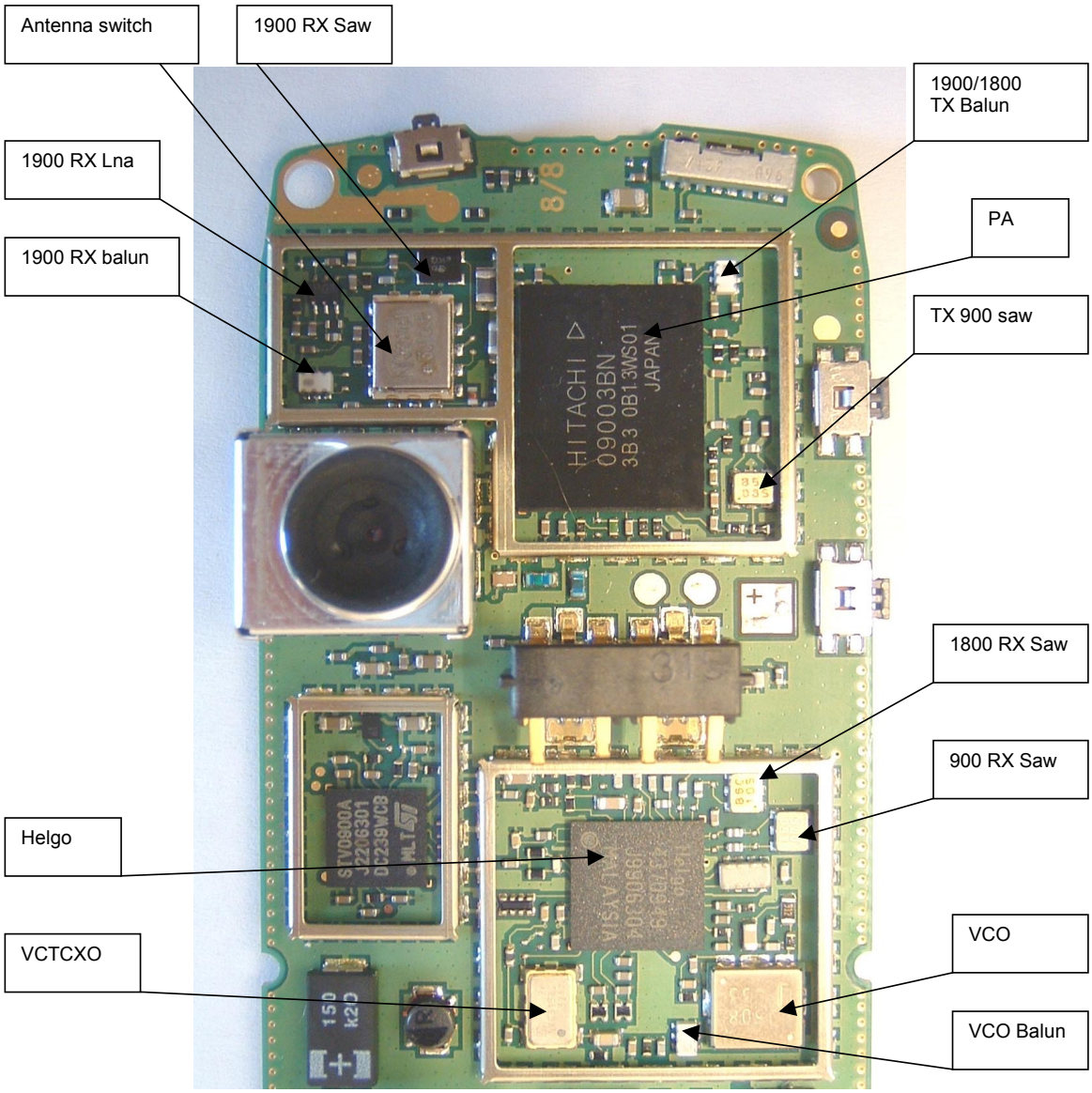
RF Key component placement

Figure 1: Component placement 1



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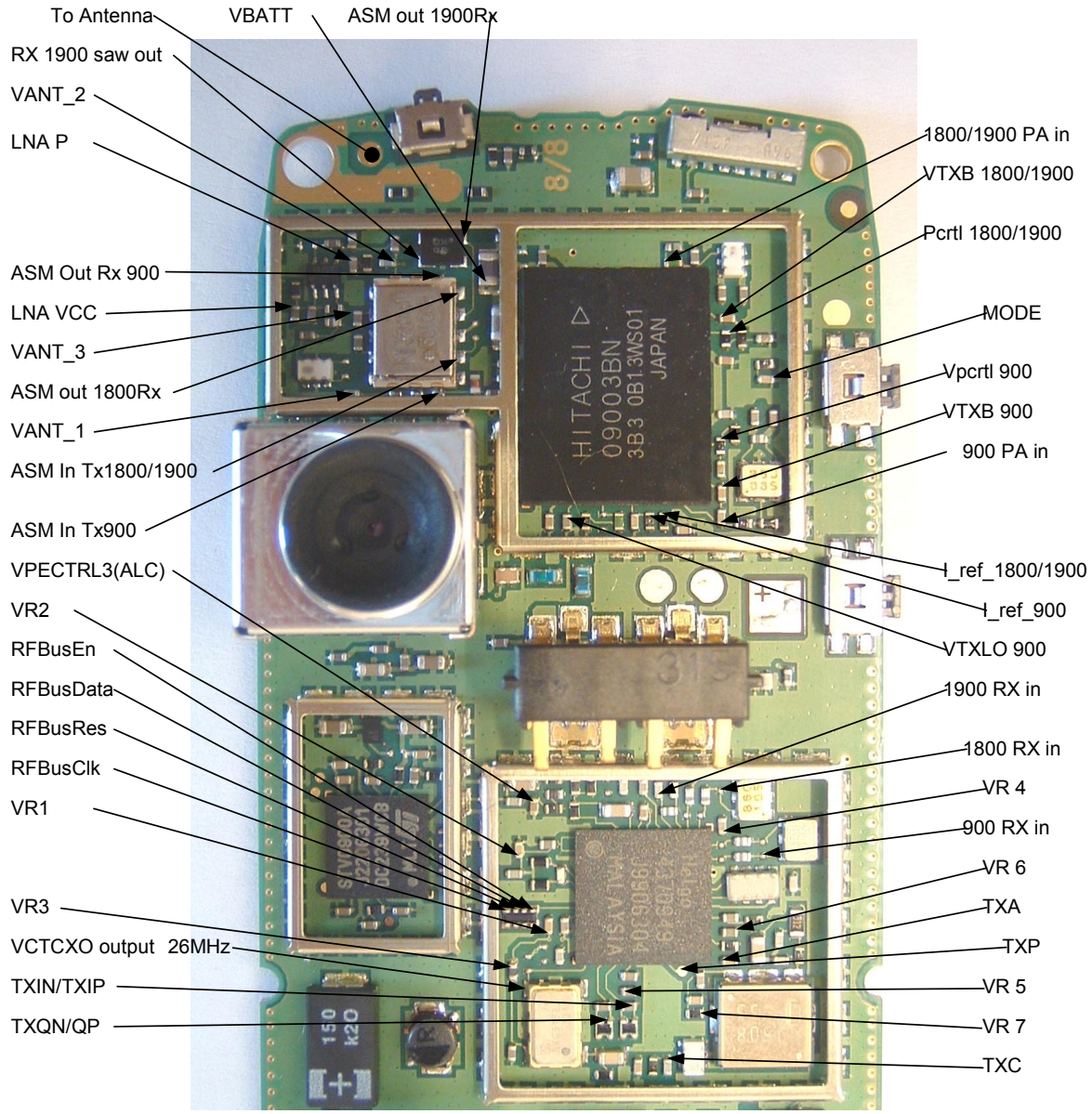
RF Measurement points

Figure 2: Component placement 2



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EGSM900, GSM1800 & GSM1900 Transmitter

General instructions for Tx troubleshooting

Kindly refer to the Service Software Section, Service Concept dagram (p.40)

Connect test jig to computer with DAU-9S cable or to FPS-8 Flash Prommer with XCS-4 modular cable.

Make sure that you have PKD-1 dongle connected to computers parallel port.

Connect DC power supply to module test jig with FLC-2 cable.

Attention: When repairing or tuning transmitter use external DC supply with at least 3A current capability. Set the DC supply voltage to 4.2V.

Connect an RF-cable to the module test jig (MJS-38) RF connector and to measurement equipment or at least a 10dB attenuator, otherwise the PA may be damaged. Normally a spectrum analyzer is used as measurement equipment.

Attention: Normally Spectrum analyzer maximum input power is +30dBm. It is recommended to use 10dB attenuator on Spectrum analyzer input to prevent damage.

Set the phone module to test jig and start Phoenix service sofware

Initialize connection to phone. (use FBUS driver when using DAU9S and COMBOX driver when using FPS-8)

Select product from the menu

File -> Choose product -> RH-20

From toolbar set operating mode to "Local"

Activate RF controls window from the menu

Testing -> RF Controls

From the RF controls window

- Select band "GSM900" or "GSM 1800" or "GSM1900" (Default = "GSM900")

- Set Active unit to "Tx" (Default = "Rx")

- Set Operation mode to "Burst" (Default = "Burst")

- Set Tx data type to "Random" (Default = "All1")

- Set Rx/Tx channel to 37 on GSM900 band or 700 on GSM1800 band or 661 on

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GSM1900 (Defaults)

- Set Tx PA mode to "Free" (Default)

- Set power level to 5 (Default = 19) on GSM900 or to 0 (Default = 15) on GSM1800 or GSM1900

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Transmitter troubleshooting diagram

Figure 3: Transmitter troubleshooting

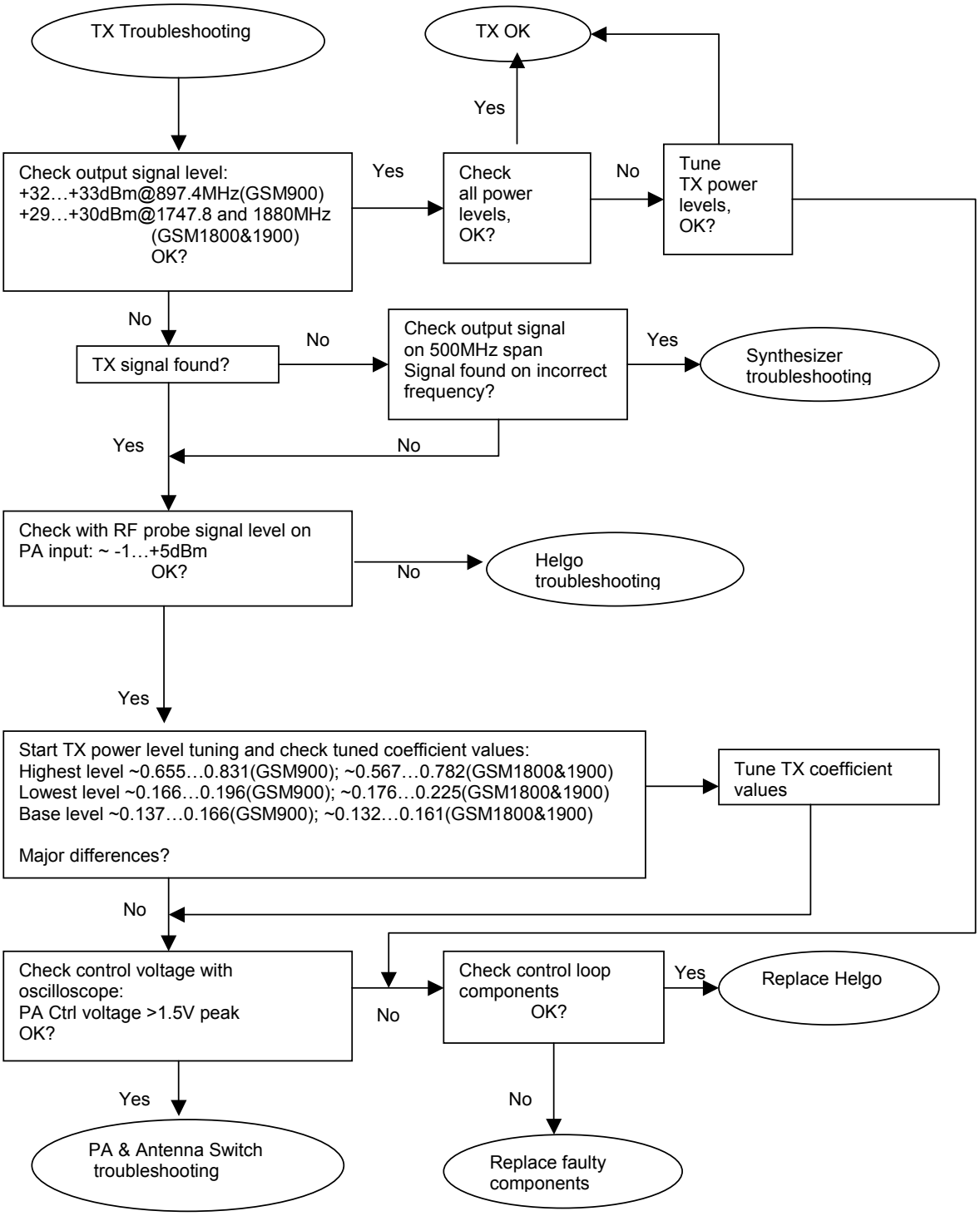

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Figure 4: HELGO IC troubleshooting

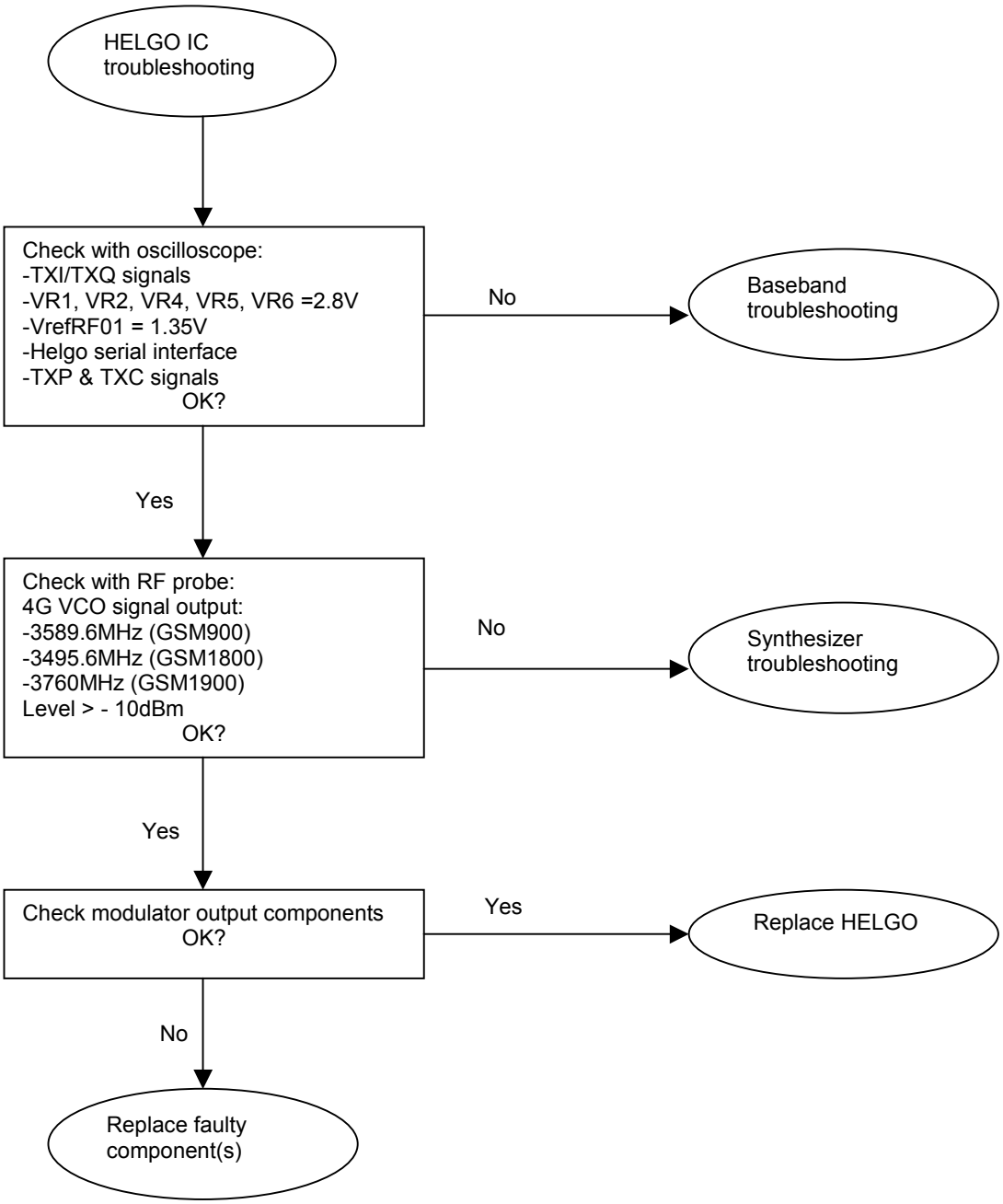
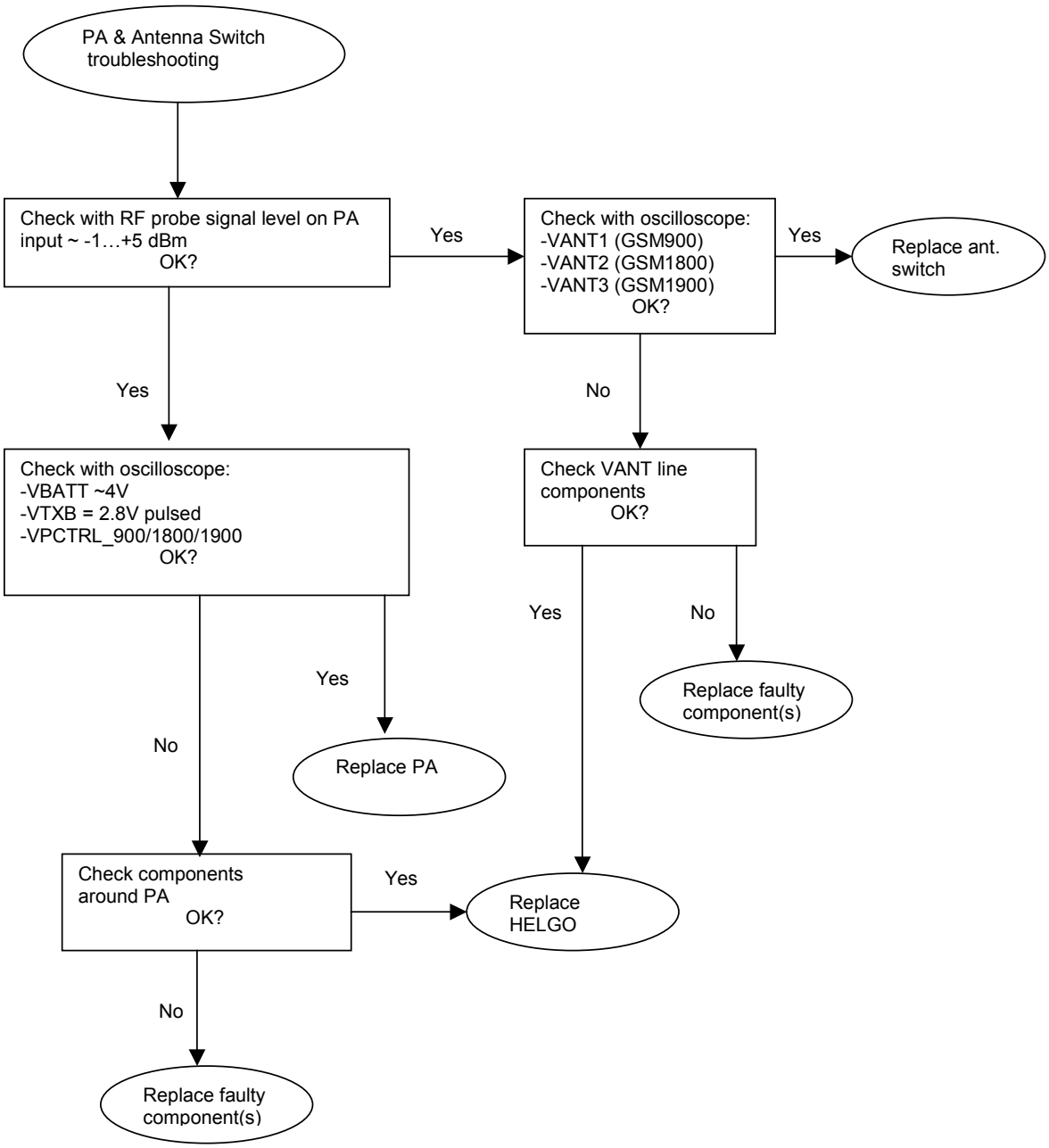
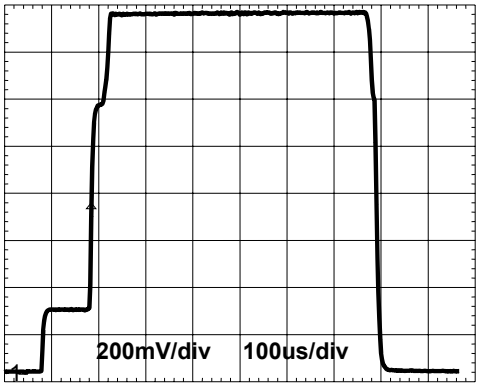


Figure 5: PA and Antenna Switch troubleshooting

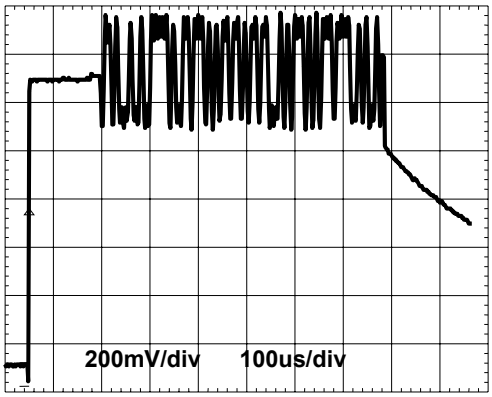


Pictures of transmitter signals

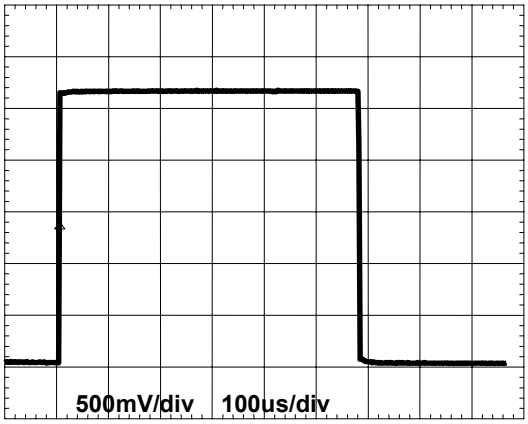
Figure 6: Transmitter signals



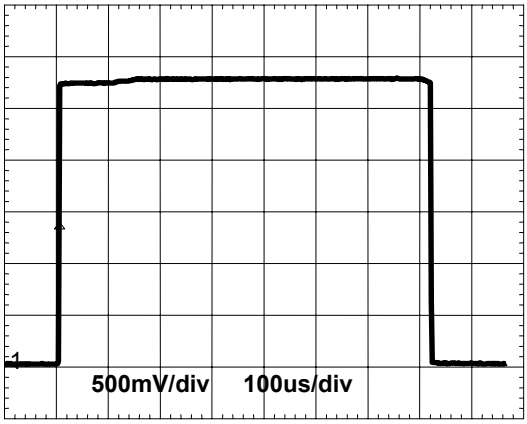
VPCTRL _900 power level high at R703/C703
VPCTRL_1800/1900 power level high at R704/C704_



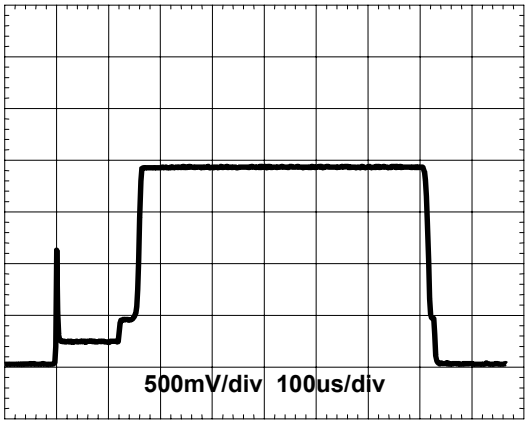
TX I/Q at R516/517 power level high Random data



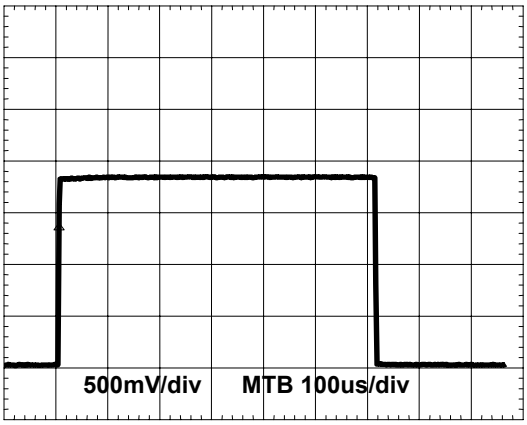
VANT_1 / GSM900 TX at C805
VANT_2 / GSM1800 TX at R804
VANT_3 / GSM1900 TX at C806 OV
(no signal/ Flatline on Oscilloscope screen)



VANT_1,VANT_2,VANT_3



VTXB_900 at C713
VTXB_1800_1900 at C714



TXP at J504

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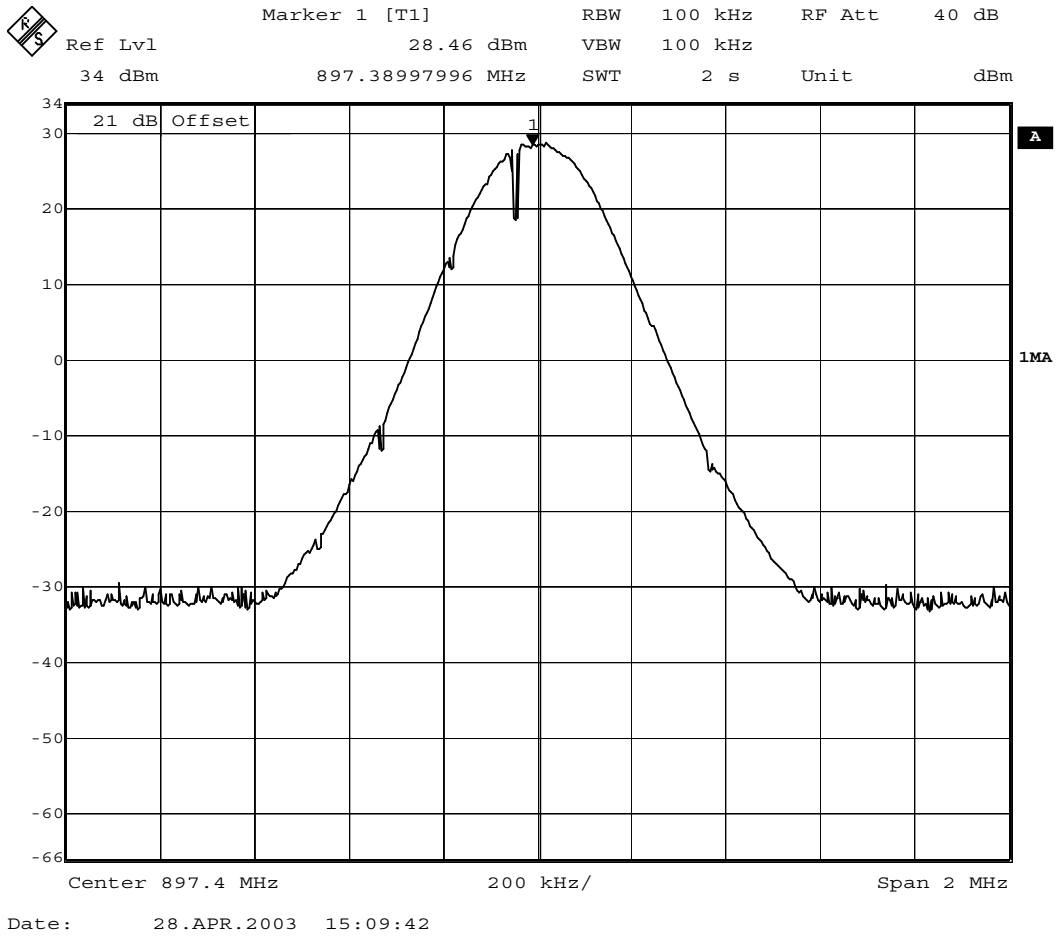
Figure 7: Tx out signal, 900 band, burst mode, channel 37



Additional information for EDGE troubleshooting

EDGE mode troubleshooting differs slightly from basic GSM troubleshooting.

Establish connection to the phone normally (see GSM900/1800/1900 troubleshooting instructions).

Select product from the menu:

File -> Choose Product -> RH-20

From toolbar set operating mode to “Local”

Activate RF controls window from the menu:

Testing -> RF Controls

From the RF controls window:

Select Band “GSM900” or “GSM1800” or “GSM1900” (Default=”GSM900”)

Set Active unit to “Tx” (Default=”Rx”)

Set Edge “On” (Default=”Off”)

Set Operation mode to “Burst” (Default=”Burst”)

Set Tx data type to “Alternate PN9” (Default=”All1”)

Set Rx/Tx channel to 37 on GSM900 or 700 on GSM1800 or 661 on GSM1900 (Defaults)

Set power level to 8 (Default = 19) on GSM900 or to 2 (Default = 15) on GSM1800 or GSM1900

NOTE! For GSM900 Edge power levels 5, 6 and 7 are not in use and for GSM1800&1900 Edge power levels 0 and 1 are not in use.

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Figure 8: Transmitter EDGE troubleshooting

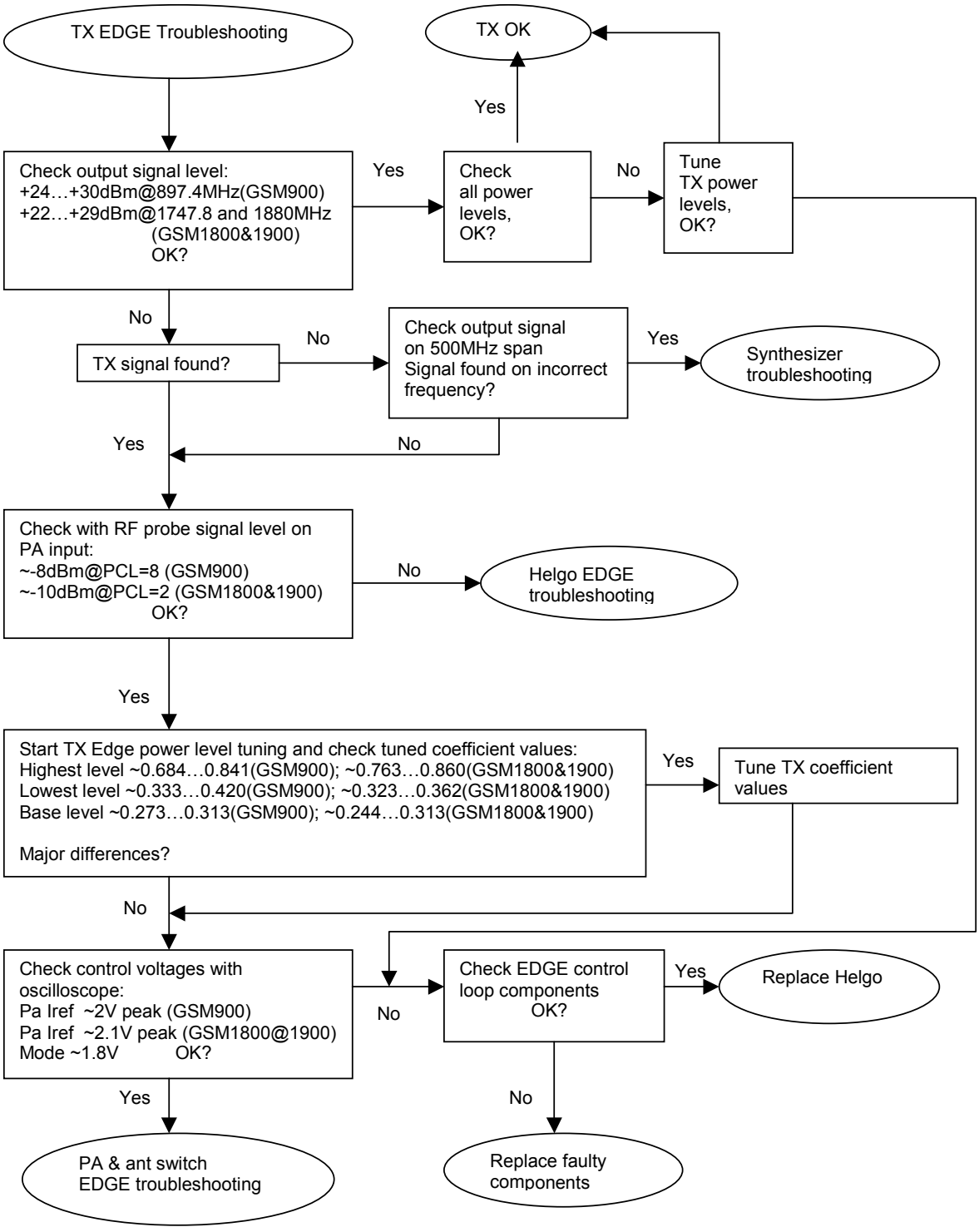

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Figure 9: Helgo EDGE troubleshooting

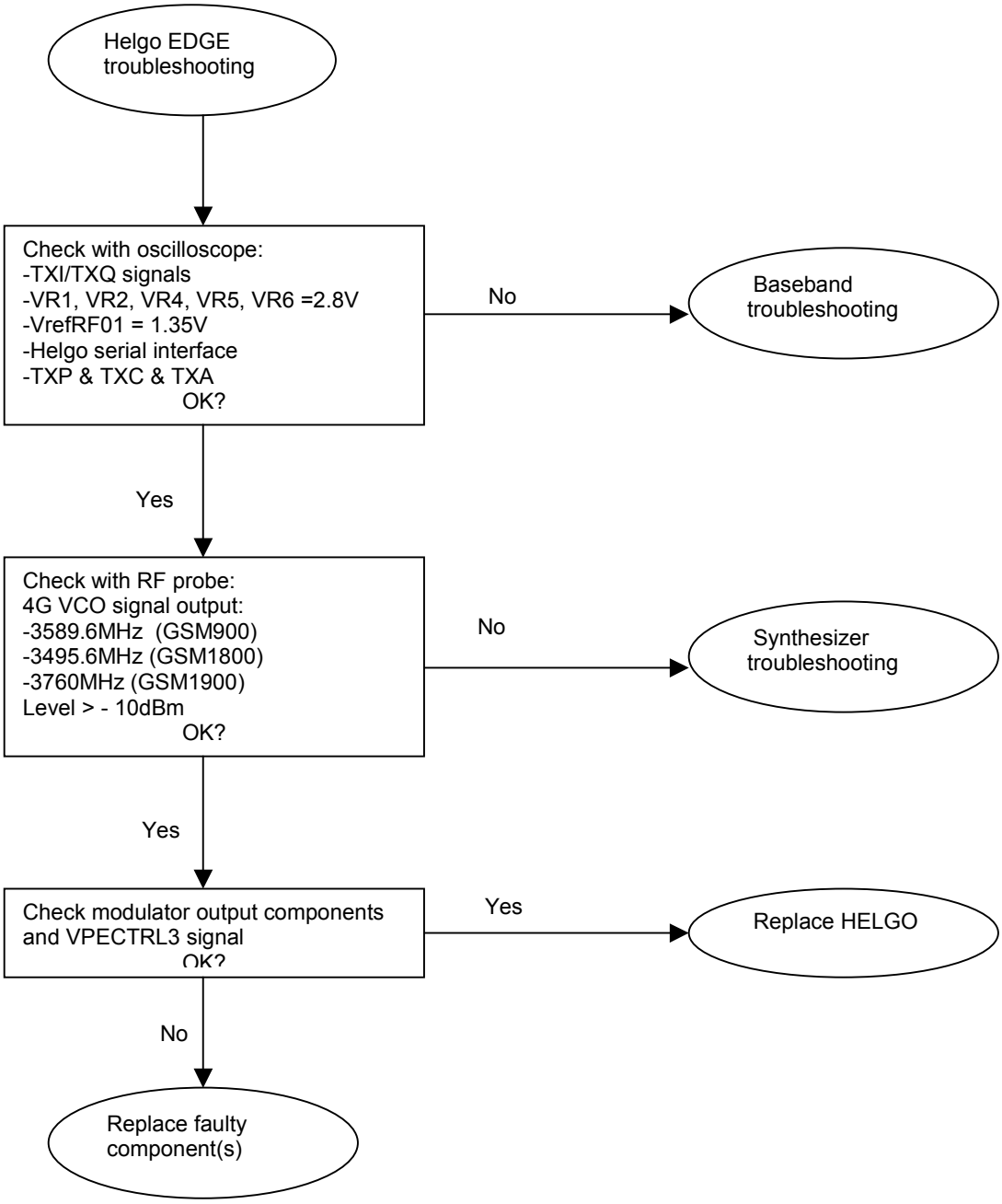
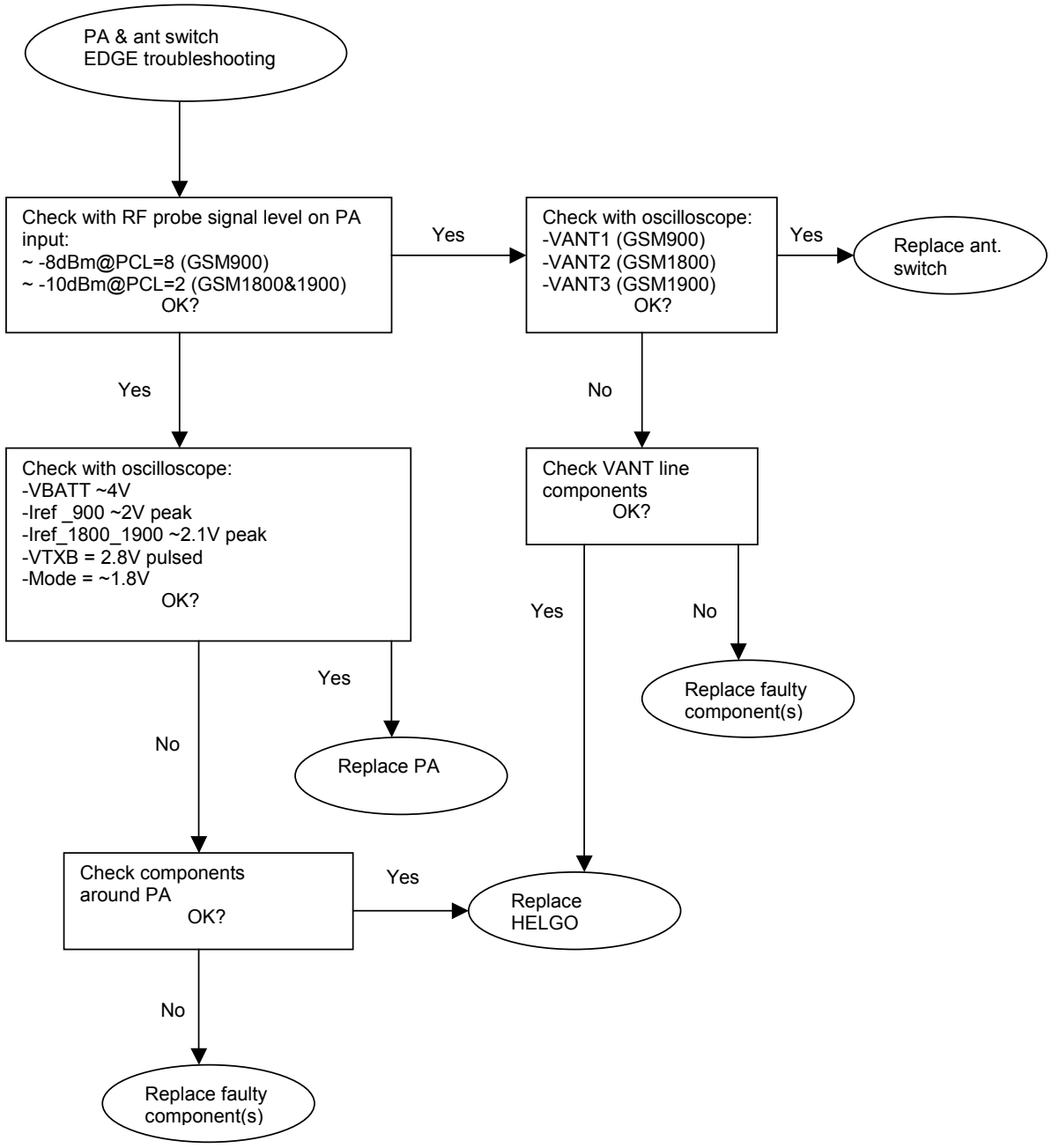


Figure 10: Pa & ant switch EDGE troubleshooting



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Pictures of EDGE transmitter signals

Figure 11: I_ref_900 power level 8 at R701/C701

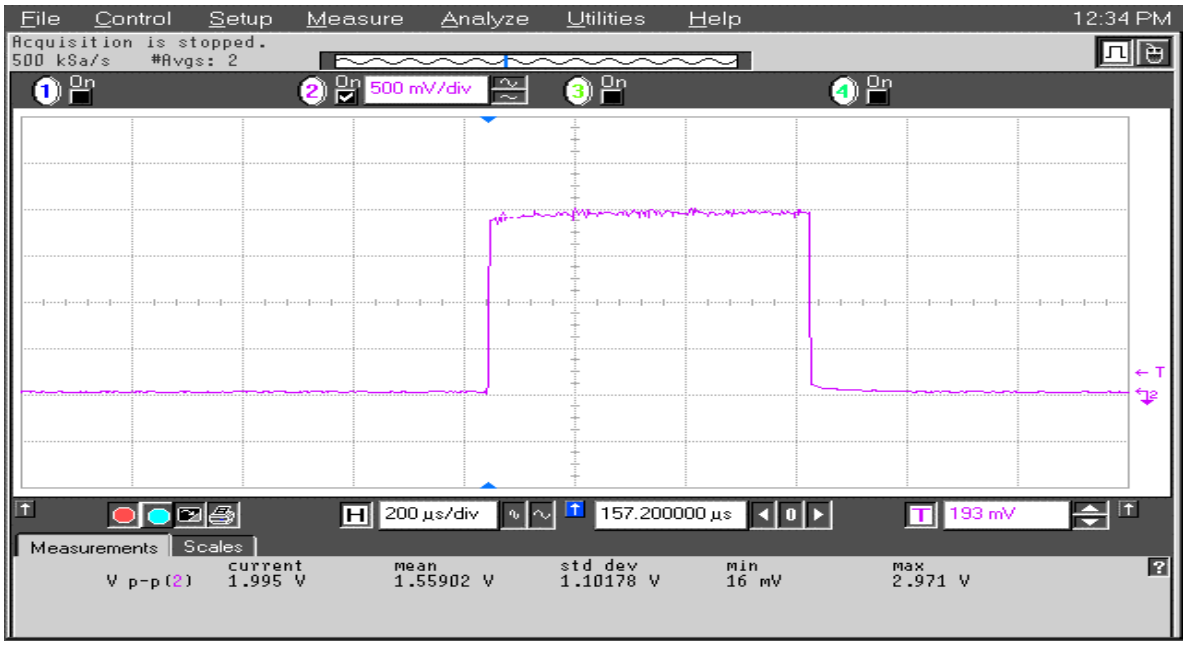

Figure 12: VTXB 900 power level 8 at C713

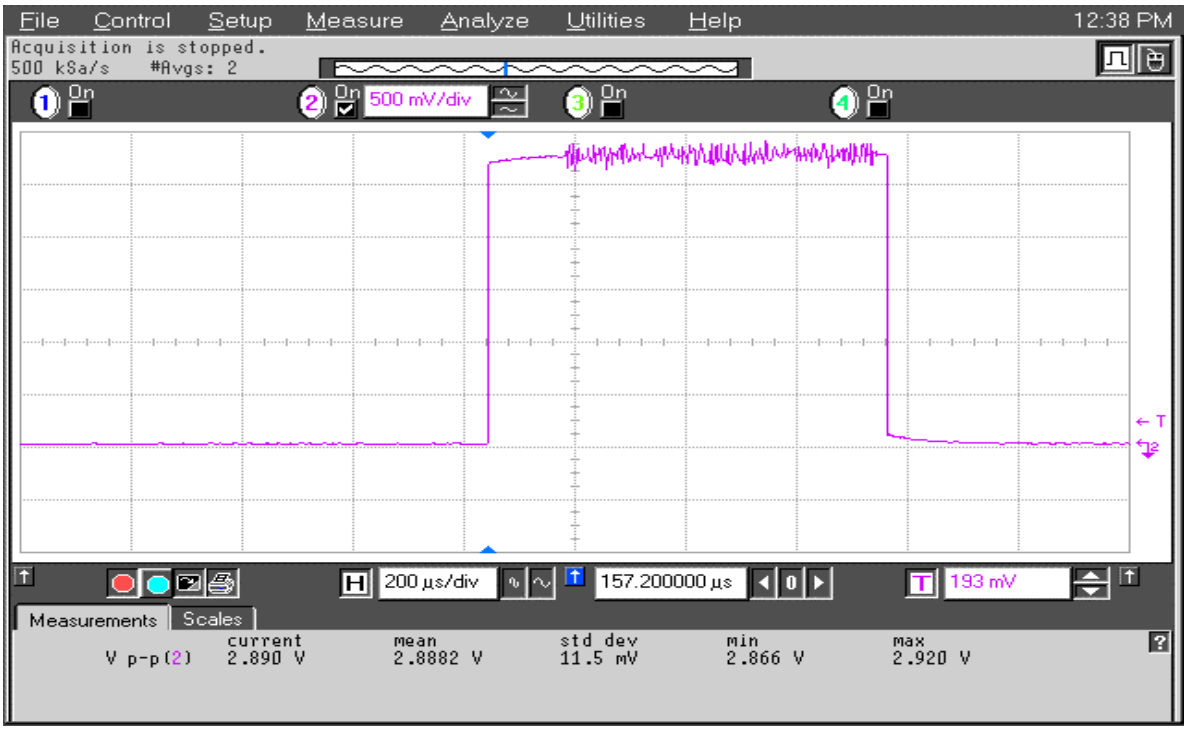

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Figure 13: I_ref_1800/1900 power level 2 at R700/C700

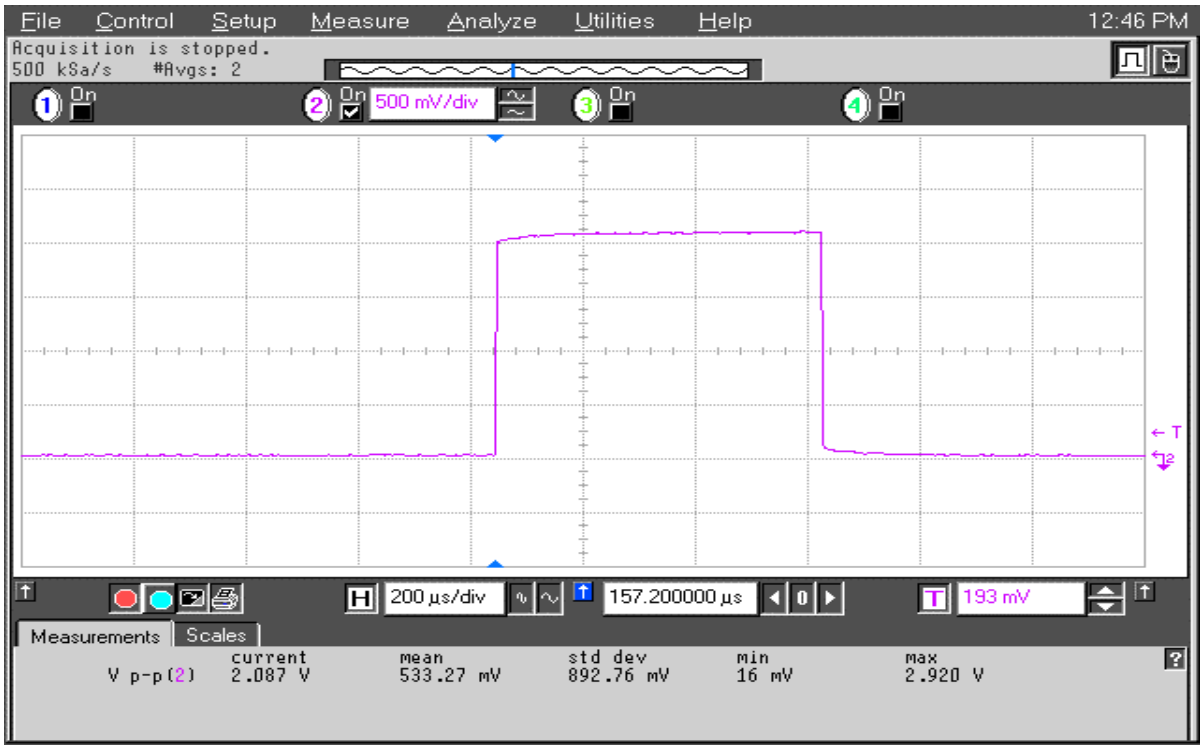

Figure 14: VTXB 1800/1900 power level 2 at C714

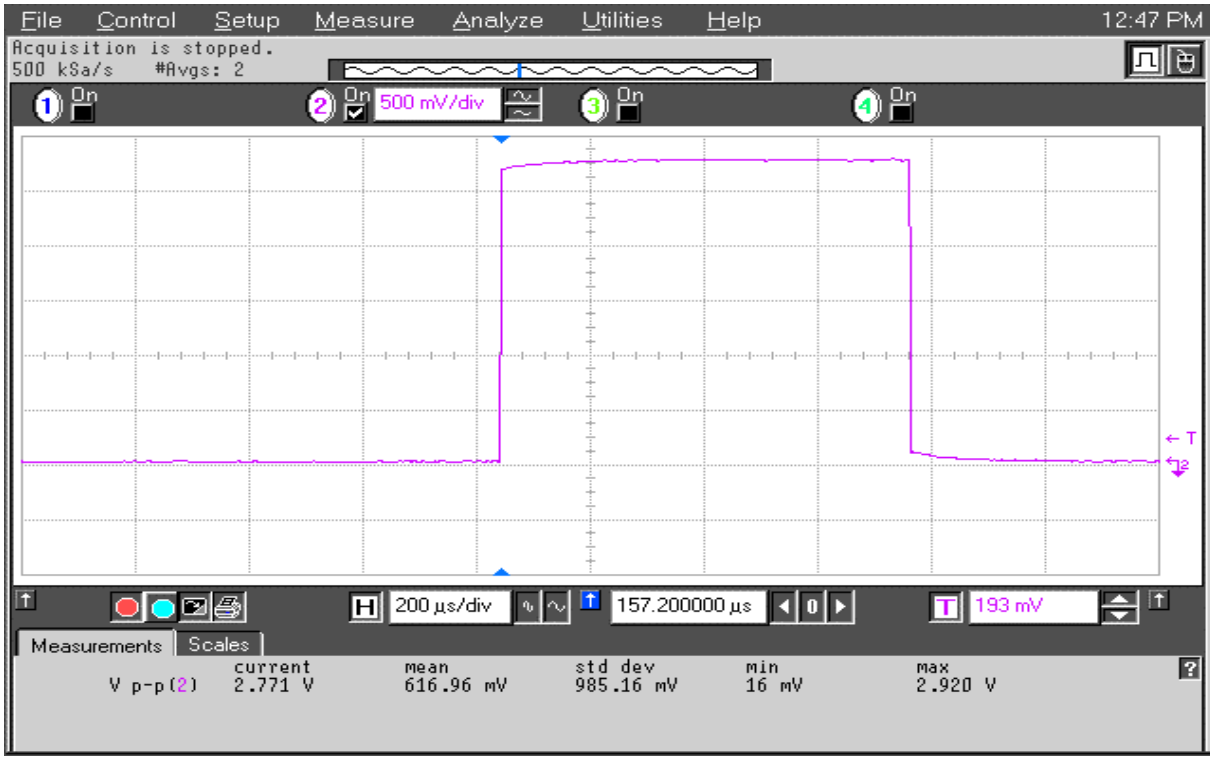

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Figure 15: TXA 850/1800/1900 at C538

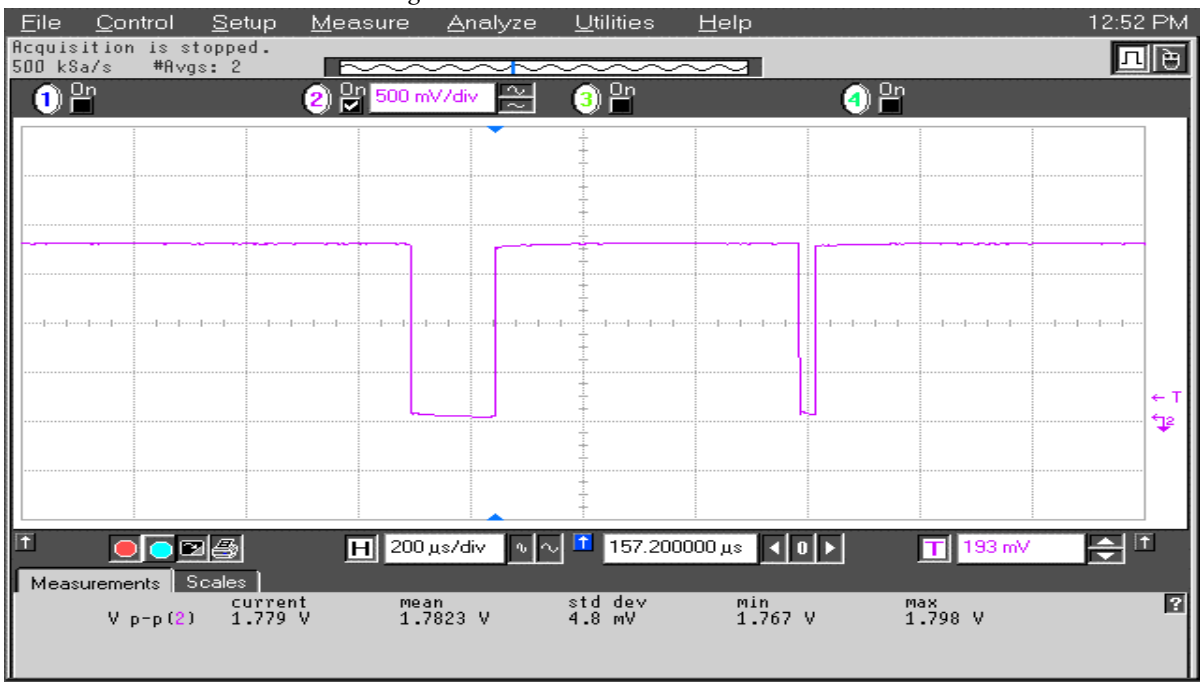

Figure 16: TXI/TXQ signal at C535/C536/R516/R517

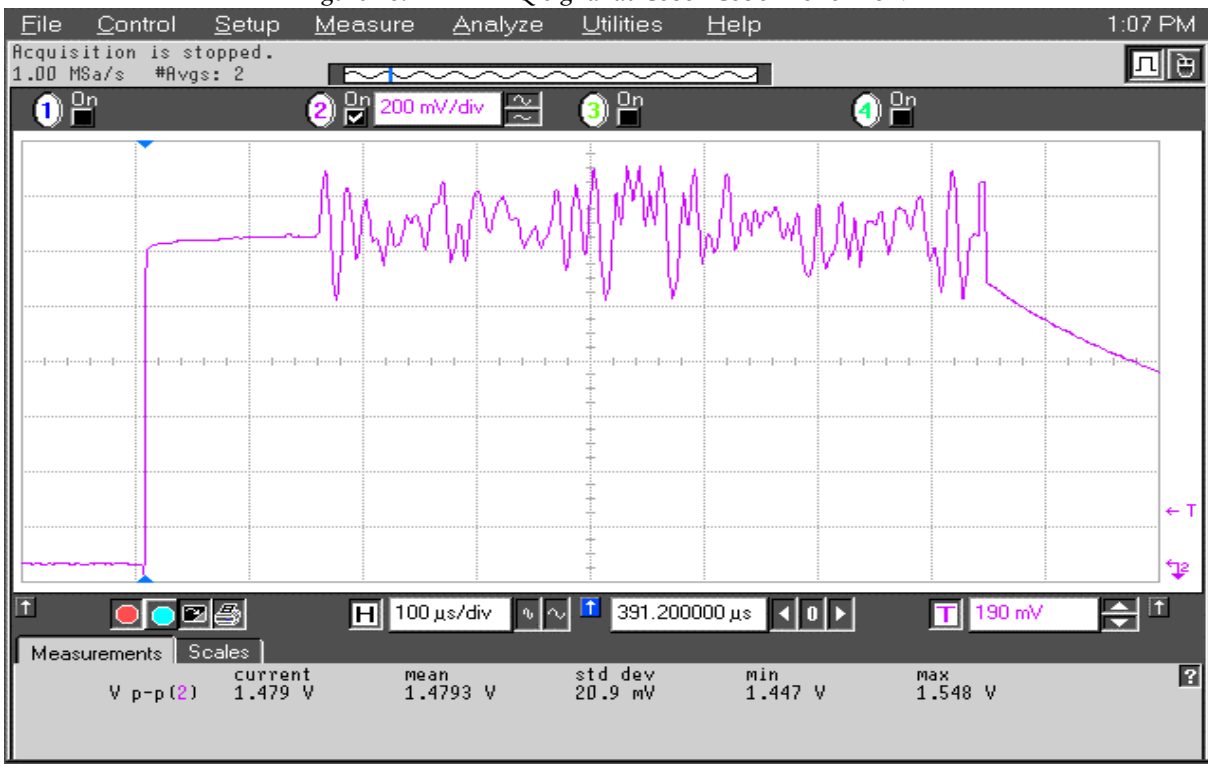

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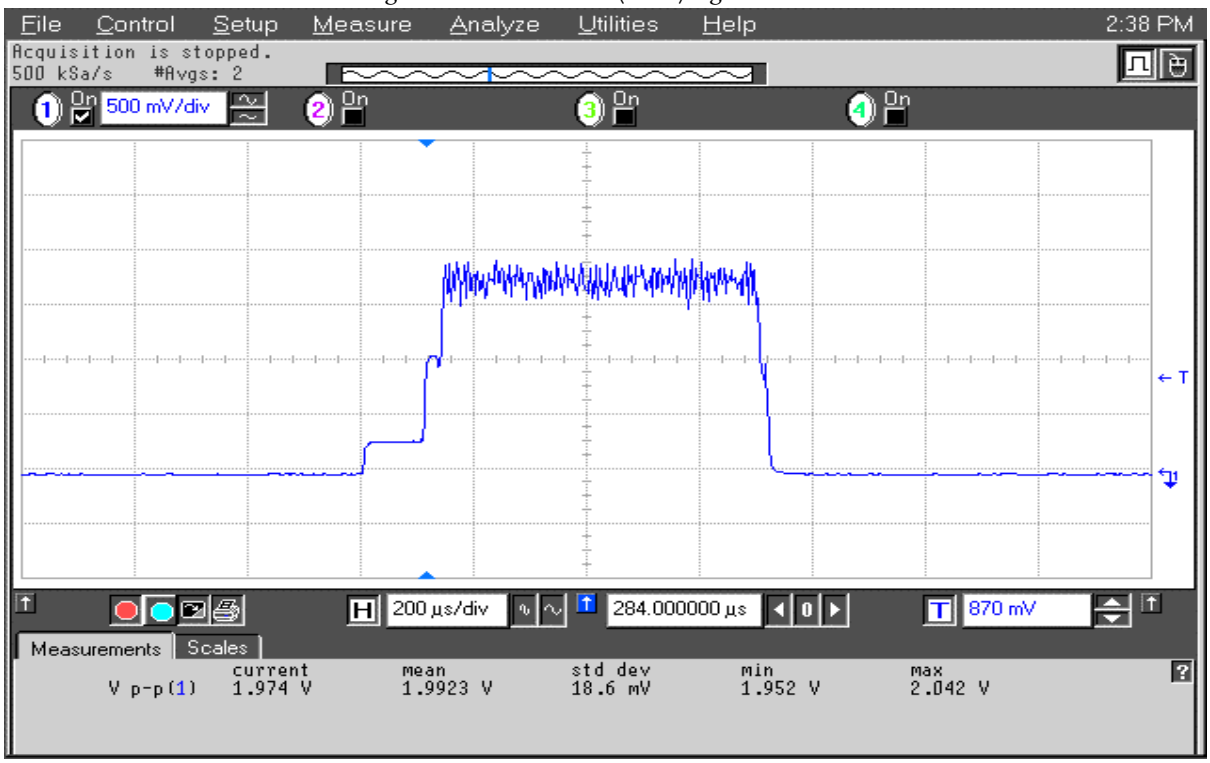
Figure 17: VPECTRL3 (ALC) signal at C512



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EGSM900, GSM1800 and GSM1900 Receiver

General instructions for Rx troubleshooting

Connect test jig to computer with DAU-9S cable or to FPS-8 Flash Prommer with XCS-4 modular cable.

Make sure that you have PKD-1 dongle connected to computers parallel port.

Connect DC power supply to module test jig with FLC-2 cable.

Set the DC supply voltage to 4.2V.

Connect an RF-cable to the module test jig (MJS-38) RF connector and to RF signal generator.

Set the phone module to test jig and start Phoenix service sofware.

Initialize connection to phone. (use FBUS driver when using DAU9S and COMBOX driver when using FPS-8)

Choose product from the menu

File -> Choose product -> RH-20

From toolbar set operating mode to "Local"

Activate RF controls window from the menu

Testing -> RF Controls

From the RF controls window:

- Select band "GSM900", "GSM 1800" or “GSM1900” (Default = "GSM900")

- Set Active unit to "Rx" (Default = "Rx")

- Set Operation mode to "Burst" (Default = "Burst")

For continuous mode:

- Set Operation mode to "Continuous"

- Set AGC to "12: FEG_ON + DTOS_ON + BB_30=Vgain60” (maximum gain setting used in normal mode)

(Default = "14: FEG_ON + DTOS_ON + BB_42=Vgain72")

- Set Rx/Tx channel to 37 on GSM900 band, 700 on GSM1800 band or 661 on GSM1900

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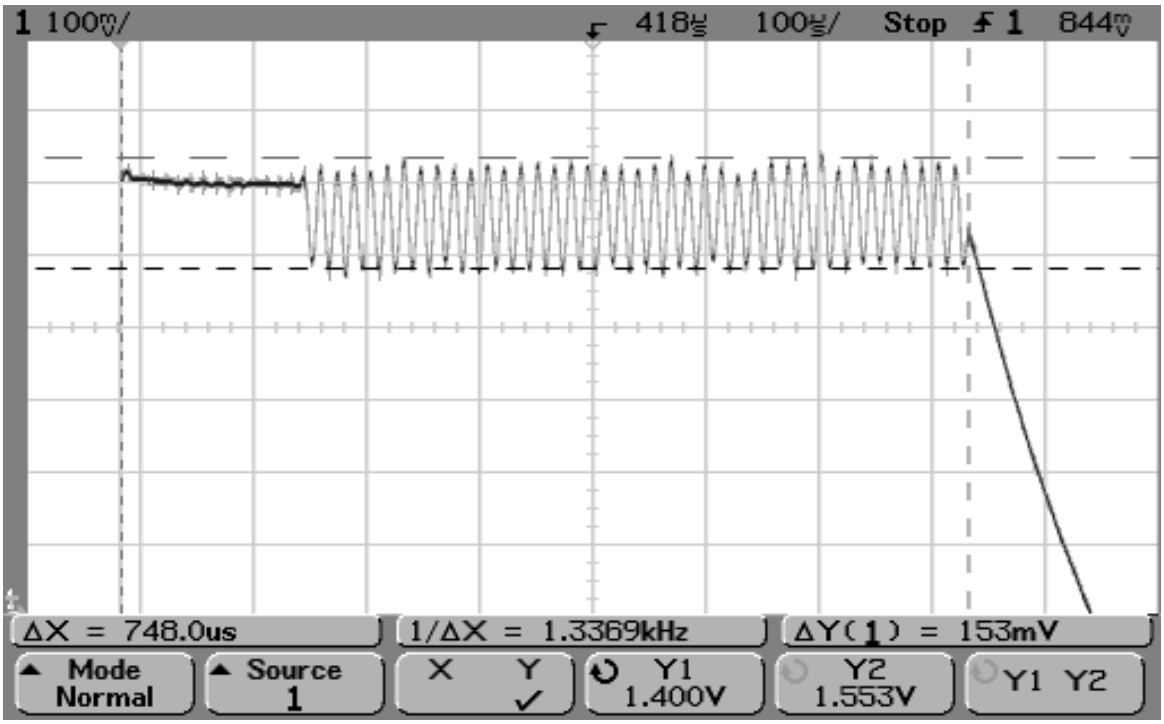
(Defaults)

Apply 942.46771 MHz (channel 37 + 67.710 kHz offset), 1842.86771 MHz (channel 700 + 67.710 kHz offset) or 1960.06771 MHz (channel 661 + 67.71 kHz) –90 dBm signal to the RF-connector (remember to compensate for cable attenuation).

Measuring with an oscilloscope on "RXI" or "RXQ" following screens should be seen on a working GSM900 , GSM1800 or GSM1900 receiver:

Figure 18: RX I/Q signal ,burst mode, input level –90dBm.



Receiver I or Q burst mode signal (channel 37) measured from testpoint RXI or RXQ with 942.46771 MHz signal, input level –90dBm at RF-connector.

Correct signal amplitudes approximately:

- GSM900~170mVpp
- GSM1800~140mVpp
- GSM1900~160mVpp

Signal part frequency 67.7kHz sine.

DC level of signal part is 1.35V. DC level can variate about +/-100mV between I and Q signals and between different bands as well.

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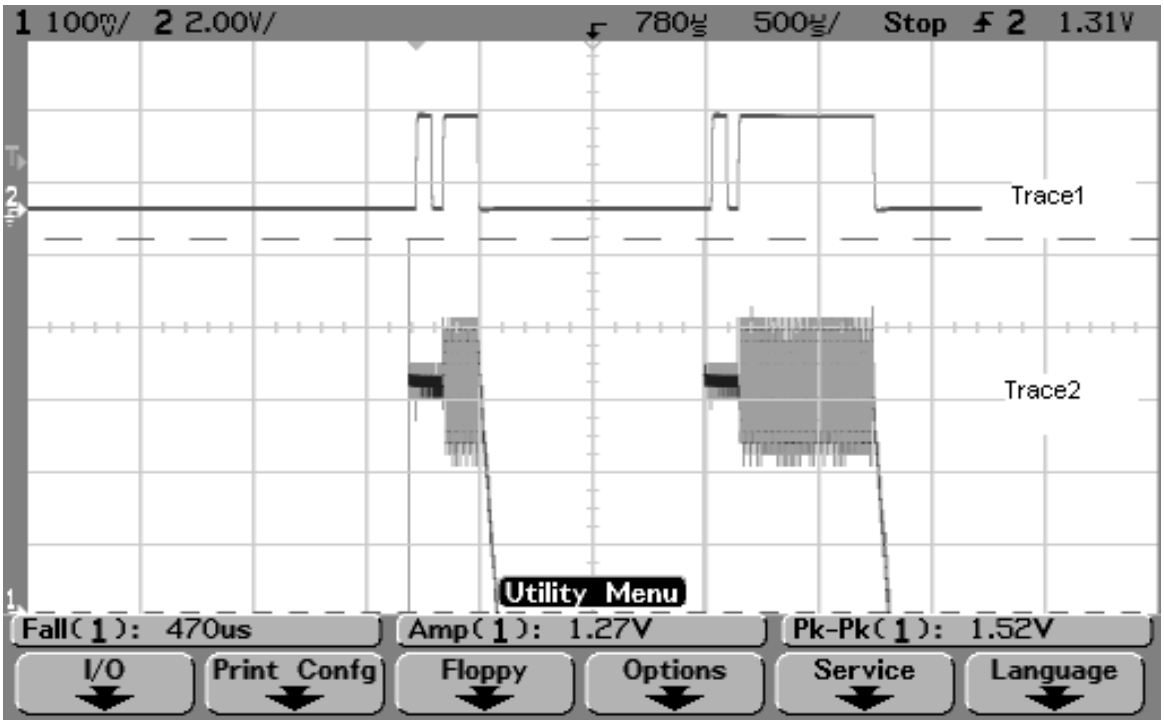
Figure 19: GSM1900 RX I or Q signal (trace2), burst mode.

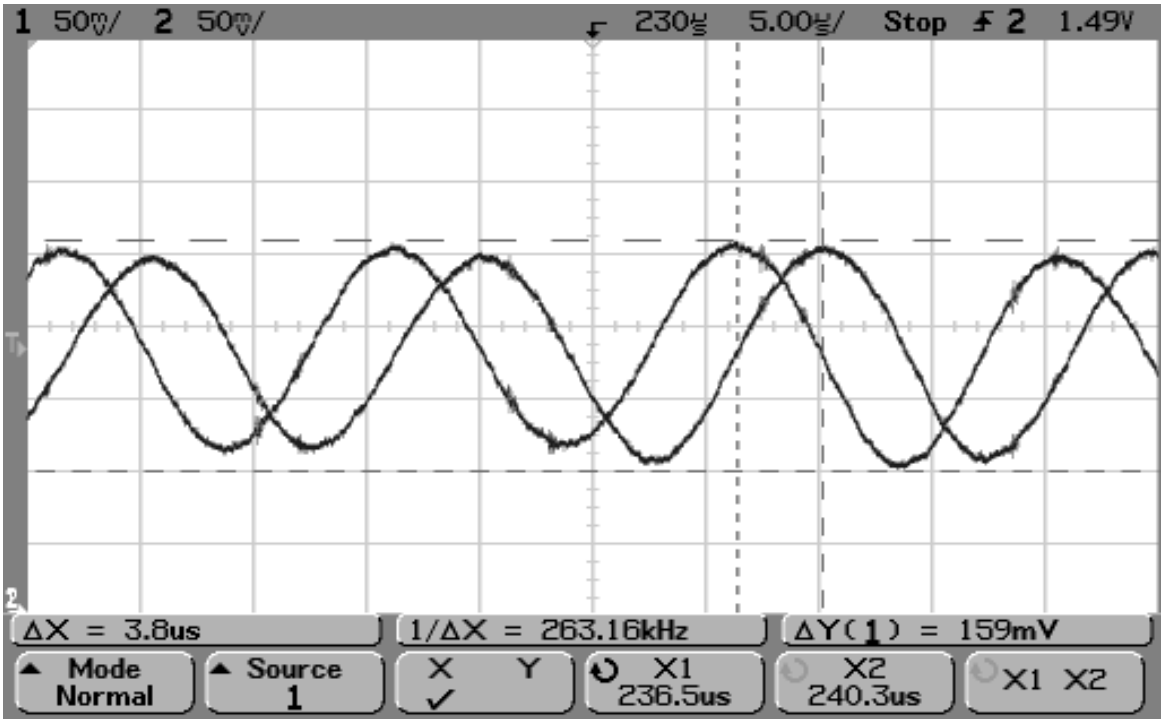


GSM1900 receiver burst mode I or Q signal at ch 661 with input signal 1960.067MHz, level –90 dBm at RF-connector.

Trace2: With wider time scaling both monitoring and own RX bursts are seen, 1st burst (shorter) is monitoring and 2nd burst (longer) is own RX burst.

Trace1: External LNA VCC supply voltage at burst mode, input level –90 dBm. Measured from testpoint LNA_VCC.

Figure 20: RX I&Q, phase difference 90 deg between signals.



Detailed view of GSM900 continuous mode RX I and Q signals measured from testpoints RXI and RXQ simultaneously.

Used channel 37, input signal 942.46771 MHz, level –90 dBm at antenna port, AGC setting 12.

Phase difference should be 90 degrees between RX I and Q signals at all bands.

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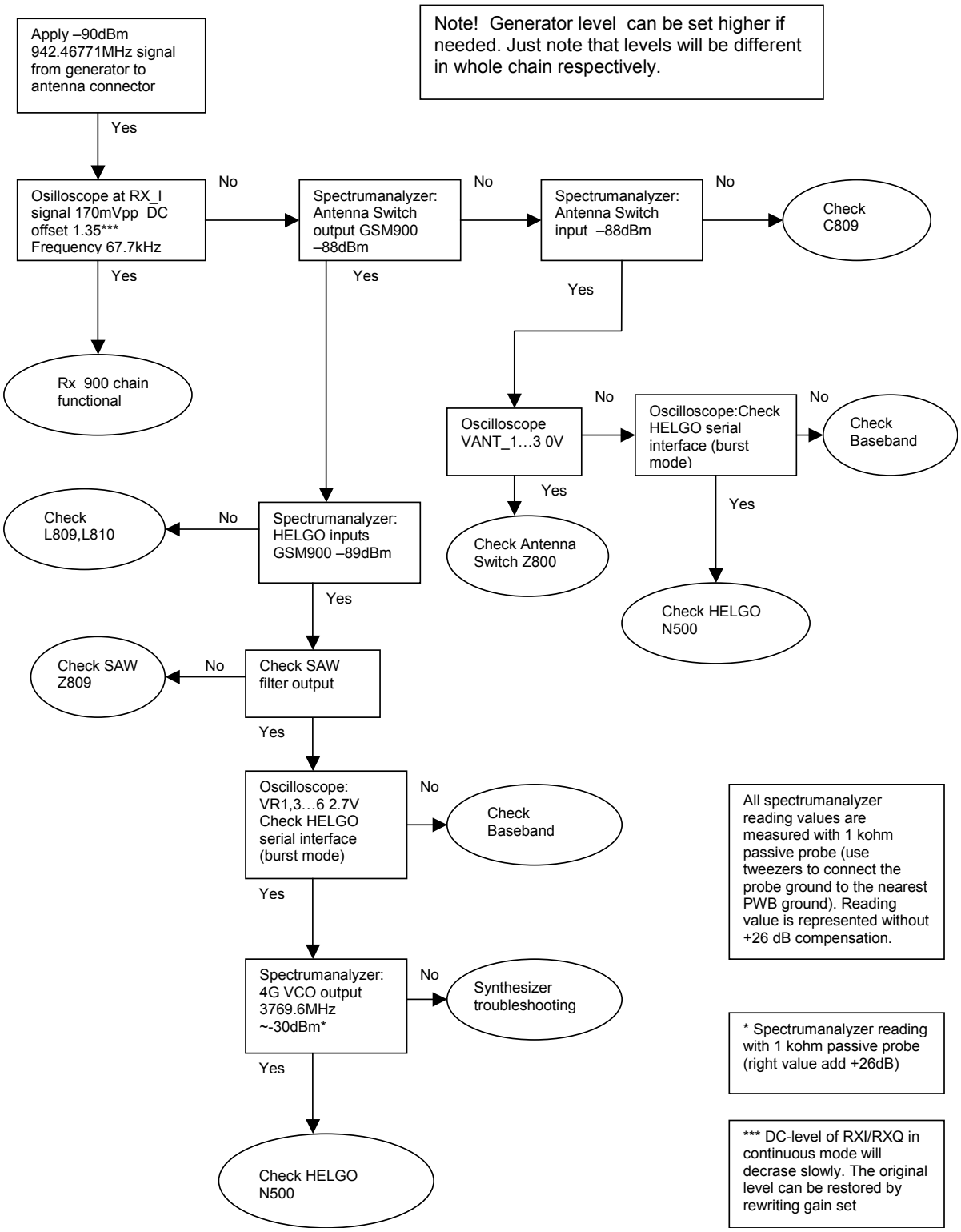
Troubleshooting diagram for GSM900 receiver

Phone in "Continuous" mode, AGC setting "12"

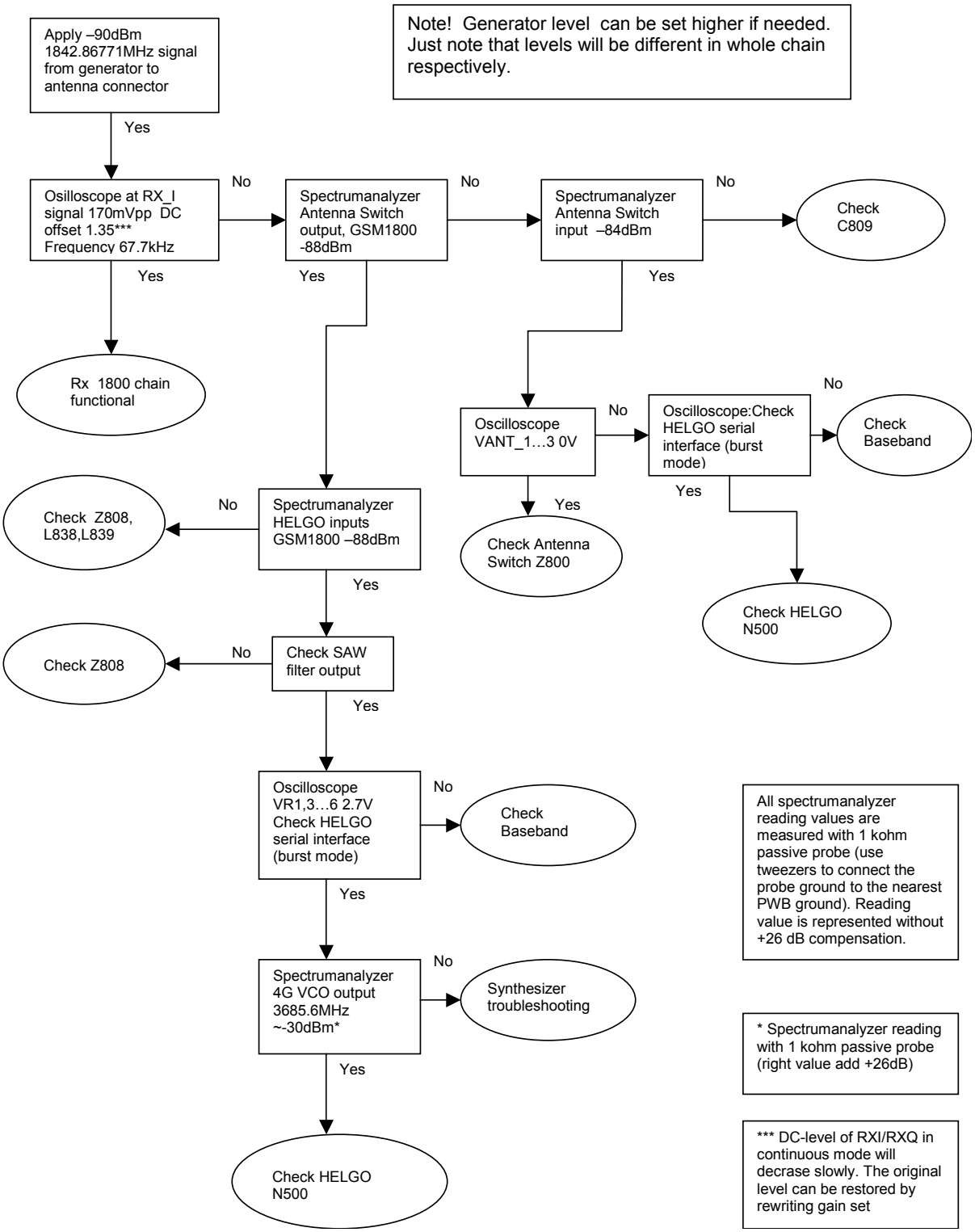
Figure 21: GSM900 receiver troubleshooting


Apply –90dBm 942.46771MHz signal from generator to antenna connector
Note! Generator level can be set higher if needed. Just note that levels will be different in whole chain respectively.
Yes
Osilloscope at RX_I signal 170mVpp DC offset 1.35*** Frequency 67.7kHz
No
Spectrumanalyzer: Antenna Switch output GSM900 –88dBm
No
Spectrumanalyzer: Antenna Switch input –88dBm
No
Check C809
Yes
Yes
Yes
Rx 900 chain functional
Oscilloscope VANT_1…3 0V
No
Oscilloscope:Check HELGO serial interface (burst mode)
No
Check Baseband
Yes
Yes
Check Antenna Switch Z800
Check HELGO N500
Check L809,L810
No
Spectrumanalyzer: HELGO inputs GSM900 –89dBm
Yes
Check SAW Z809
No
Check SAW filter output
Yes
Oscilloscope: VR1,3…6 2.7V Check HELGO serial interface (burst mode)
No
Check Baseband
Yes
Spectrumanalyzer: 4G VCO output 3769.6MHz ~-30dBm*
No
Synthesizer troubleshooting
Yes
Check HELGO N500
All spectrumanalyzer reading values are measured with 1 kohm passive probe (use tweezers to connect the probe ground to the nearest PWB ground). Reading value is represented without +26 dB compensation.
* Spectrumanalyzer reading with 1 kohm passive probe (right value add +26dB)
*** DC-level of RXI/RXQ in continuous mode will decrase slowly. The original level can be restored by rewriting gain set

Troubleshooting diagram for GSM1800 receiver

Phone in "Continuous" mode, AGC setting "12

Figure 22: GSM1800 receiver troubleshooting


Note! Generator level can be set higher if needed. Just note that levels will be different in whole chain respectively.
Apply –90dBm 1842.86771MHz signal from generator to antenna connector
Yes
Osilloscope at RX_I signal 170mVpp DC offset 1.35*** Frequency 67.7kHz
No
Spectrumanalyzer Antenna Switch output, GSM1800 -88dBm
No
Spectrumanalyzer Antenna Switch input –84dBm
No
Check C809
Yes
Yes
Yes
Rx 1800 chain functional
Oscilloscope VANT_1…3 0V
No
Oscilloscope:Check HELGO serial interface (burst mode)
No
Check Baseband
Yes
Yes
Check Antenna Switch Z800
Check HELGO N500
Check Z808, L838,L839
No
Spectrumanalyzer HELGO inputs GSM1800 –88dBm
Yes
Check Z808
No
Check SAW filter output
Yes
Oscilloscope VR1,3…6 2.7V Check HELGO serial interface (burst mode)
No
Check Baseband
Yes
Spectrumanalyzer 4G VCO output 3685.6MHz ~-30dBm*
No
Synthesizer troubleshooting
Yes
Check HELGO N500
All spectrumanalyzer reading values are measured with 1 kohm passive probe (use tweezers to connect the probe ground to the nearest PWB ground). Reading value is represented without +26 dB compensation.
* Spectrumanalyzer reading with 1 kohm passive probe (right value add +26dB)
*** DC-level of RXI/RXQ in continuous mode will decrase slowly. The original level can be restored by rewriting gain set

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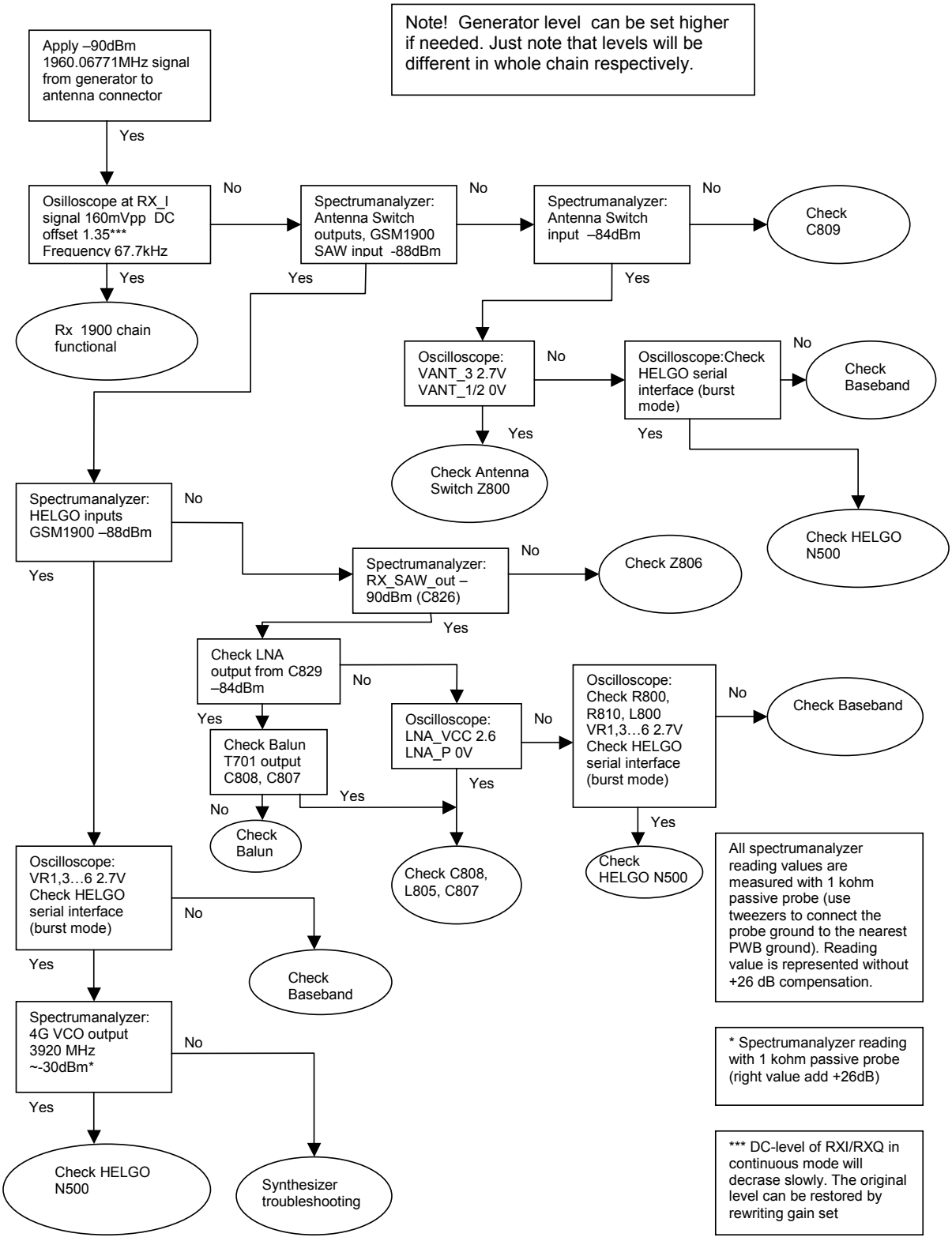
Troubleshooting diagram for GSM1900 receiver

Phone in "Continuous" mode, AGC setting "12

Figure 23: GSM1900 receiver troubleshooting


Note! Generator level can be set higher if needed. Just note that levels will be different in whole chain respectively.
Apply –90dBm 1960.06771MHz signal from generator to antenna connector
Yes
Osilloscope at RX_I signal 160mVpp DC offset 1.35*** Frequency 67.7kHz
No
Spectrumanalyzer: Antenna Switch outputs, GSM1900 SAW input -88dBm
No
Spectrumanalyzer: Antenna Switch input –84dBm
No
Check C809
Yes
Yes
Yes
Rx 1900 chain functional
Oscilloscope: VANT_3 2.7V VANT_1/2 0V
No
Oscilloscope:Check HELGO serial interface (burst mode)
No
Check Baseband
Yes
Yes
Check Antenna Switch Z800
Spectrumanalyzer: HELGO inputs GSM1900 –88dBm
No
Check HELGO N500
Yes
Spectrumanalyzer: RX_SAW_out – 90dBm (C826)
No
Check Z806
Yes
Check LNA output from C829 –84dBm
No
Yes
Check Balun T701 output C808, C807
Oscilloscope: LNA_VCC 2.6 LNA_P 0V
No
Oscilloscope: Check R800, R810, L800 VR1,3…6 2.7V Check HELGO serial interface (burst mode)
No
Check Baseband
Yes
Yes
No
Yes
Check Balun
Check C808, L805, C807
Check HELGO N500
Oscilloscope: VR1,3…6 2.7V Check HELGO serial interface (burst mode)
No
Yes
Check Baseband
Spectrumanalyzer: 4G VCO output 3920 MHz ~-30dBm*
No
Yes
Check HELGO N500
Synthesizer troubleshooting
All spectrumanalyzer reading values are measured with 1 kohm passive probe (use tweezers to connect the probe ground to the nearest PWB ground). Reading value is represented without +26 dB compensation.
* Spectrumanalyzer reading with 1 kohm passive probe (right value add +26dB)
*** DC-level of RXI/RXQ in continuous mode will decrase slowly. The original level can be restored by rewriting gain set

Synthesizer

General instructions for synthesizer troubleshooting

Connect test jig to computer with DAU9S cable or to FPS-8 Flash Prommer with XCS-4 modular cable.

Make sure that you have PKD-1 dongle connected to computers parallel port.

Connect DC power supply or FPS-8 to module test jig with PCS-1 cable.

Set the DC supply voltage to 4.2V.

Set the phone module to test jig and start Phoenix service sofware

Initialize connection to phone. (use FBUS driver when using DAU9S and COMBOX driver when using FPS-8)

Select product from the menu

File -> Choose product -> RH-20

From toolbar set operating mode to "Local"

Activate RF controls window from the menu

Testing -> RF Controls

From the RF controls window

- Select band "GSM900", "GSM 1800" or "GSM1900" (Default = "GSM900")

- Set Active unit to "Rx" (Default = "Rx")

- Set Operation mode to "Continuous" (Default = "Burst")

- Set Rx/Tx channel to 37 on GSM900 band, 700 on GSM1800 band, 661 on GSM1900 band (Defaults)

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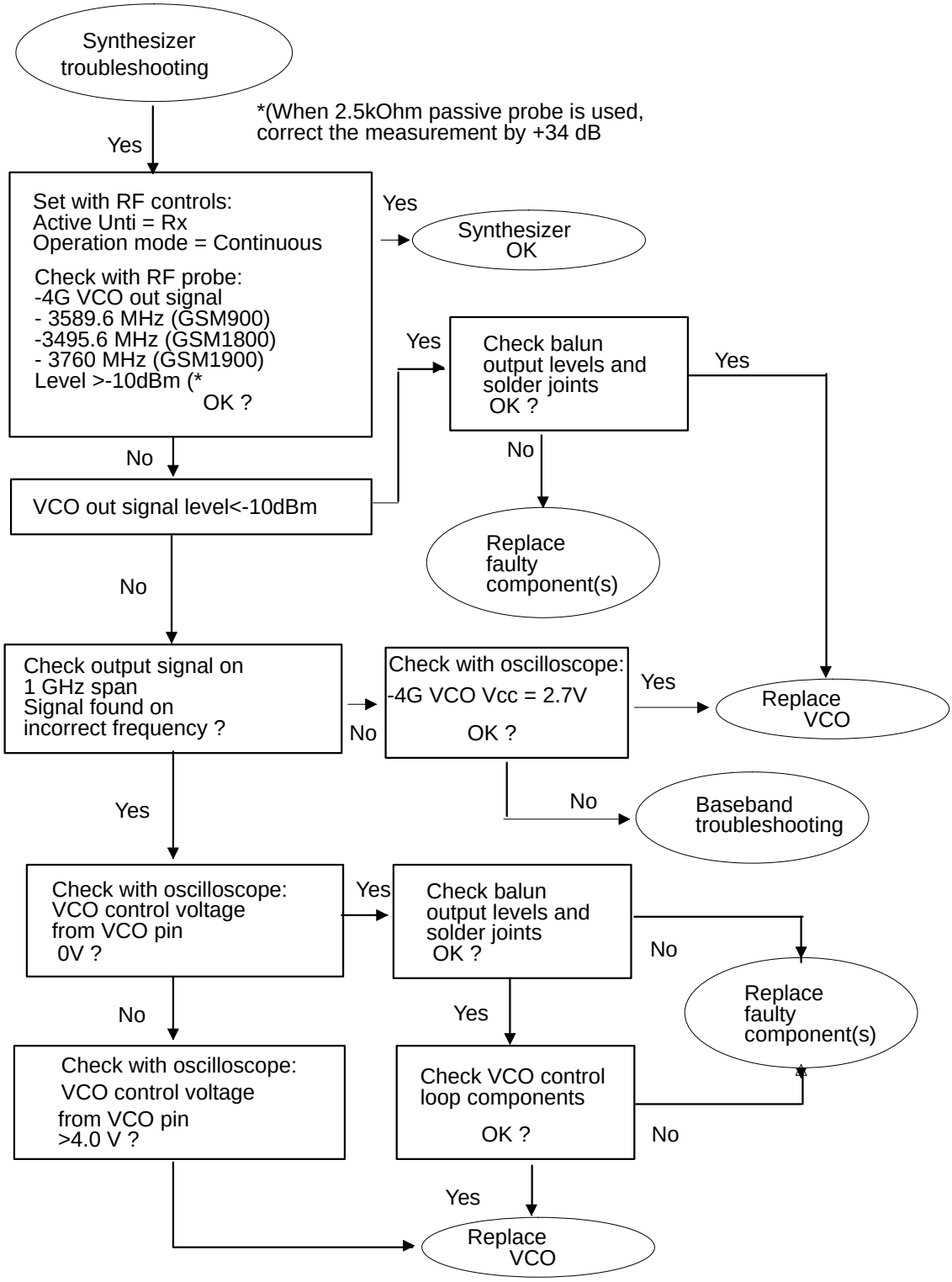
Figure 24: Synthesizer troubleshooting diagram



Pictures of synthesizer signals

Figure 25: 26MHz at G501 pin out

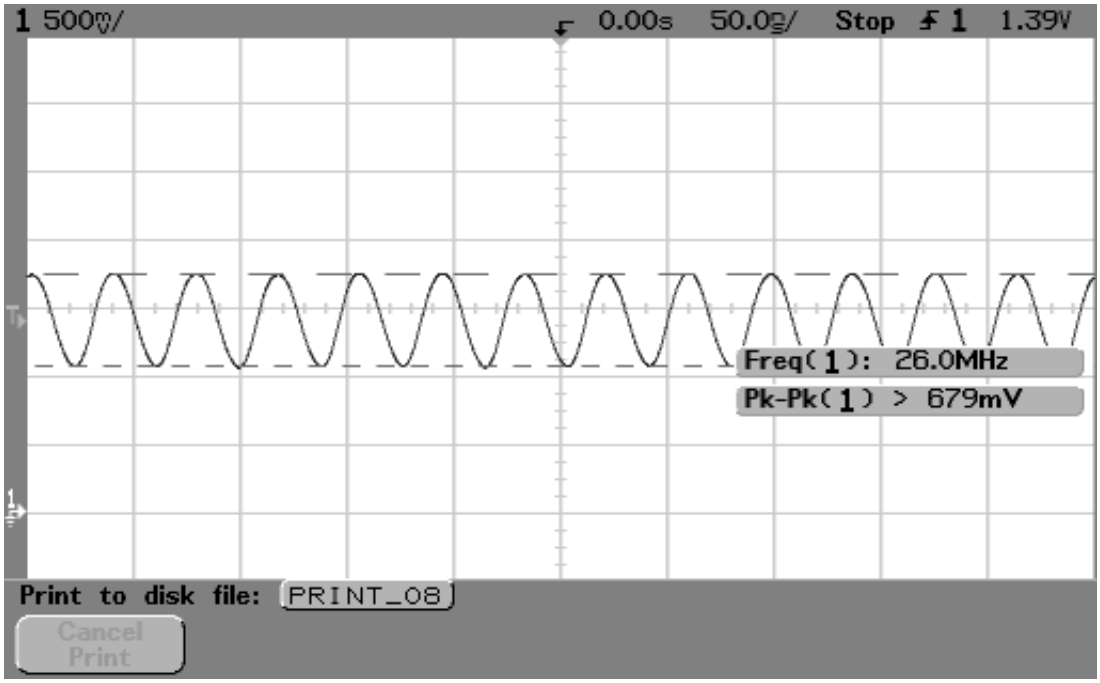


Figure 26: 26MHz RFCLK at R420/C420

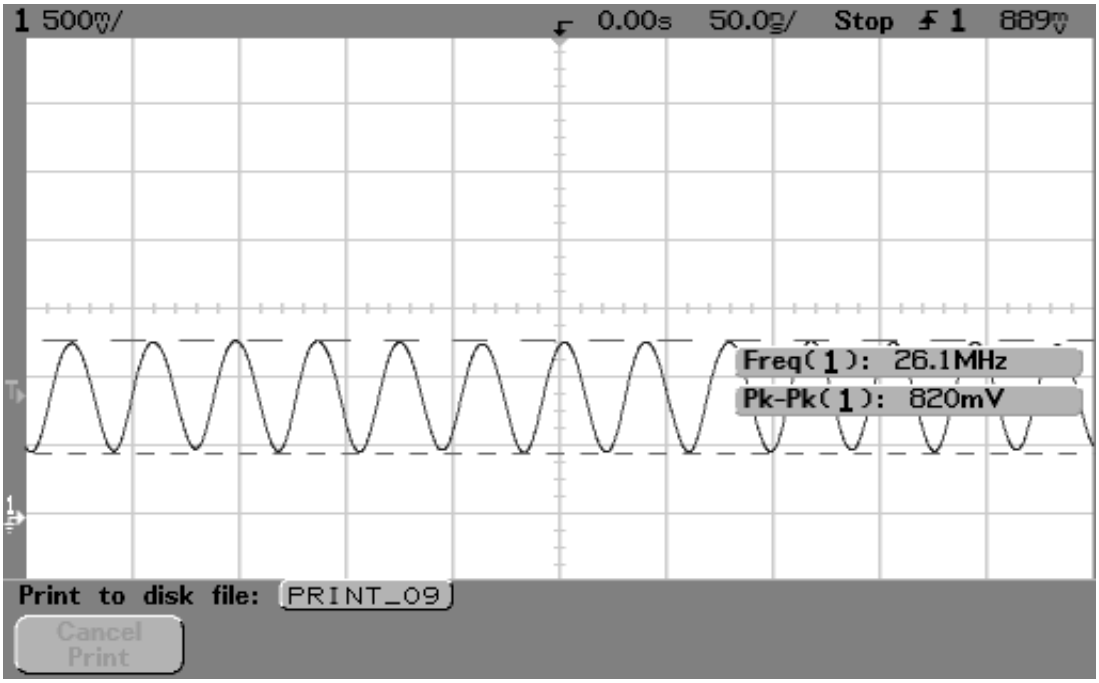


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Figure 27: 1800 TX, channel 512, burst mode

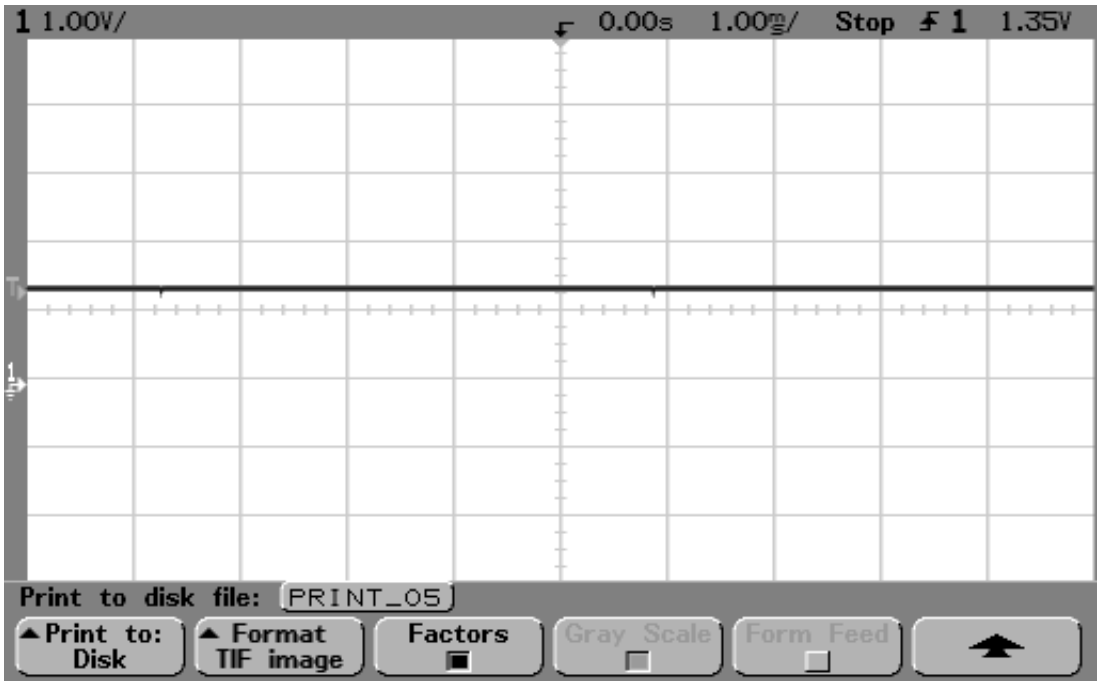

Figure 28: 1900 RX, channel 810, continuous mode

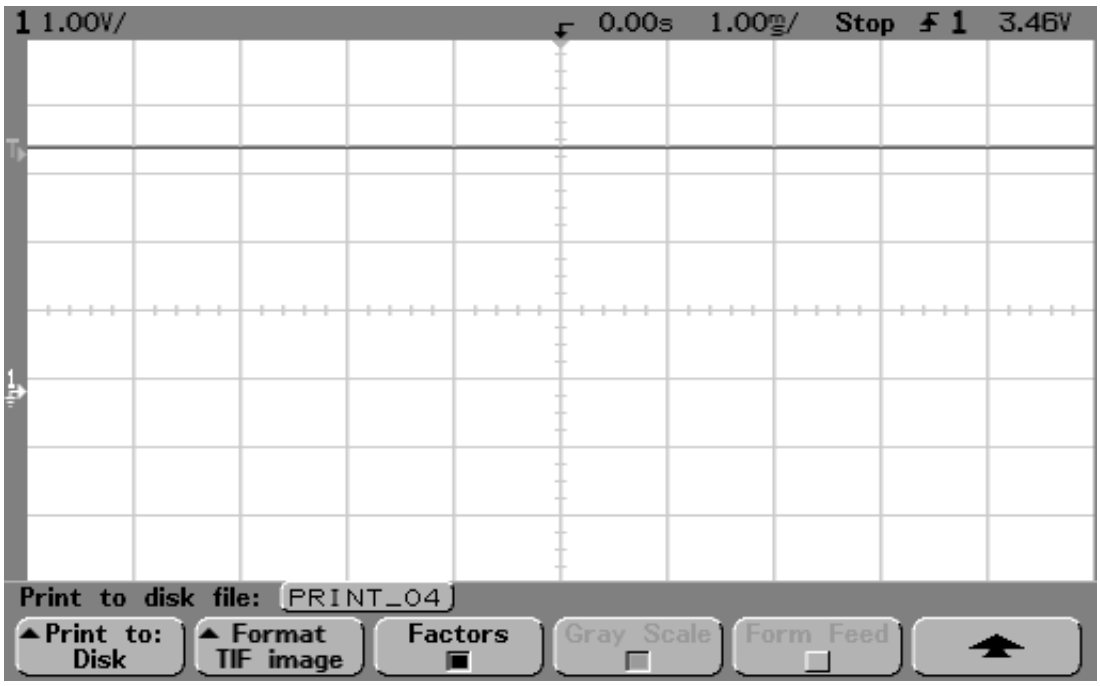

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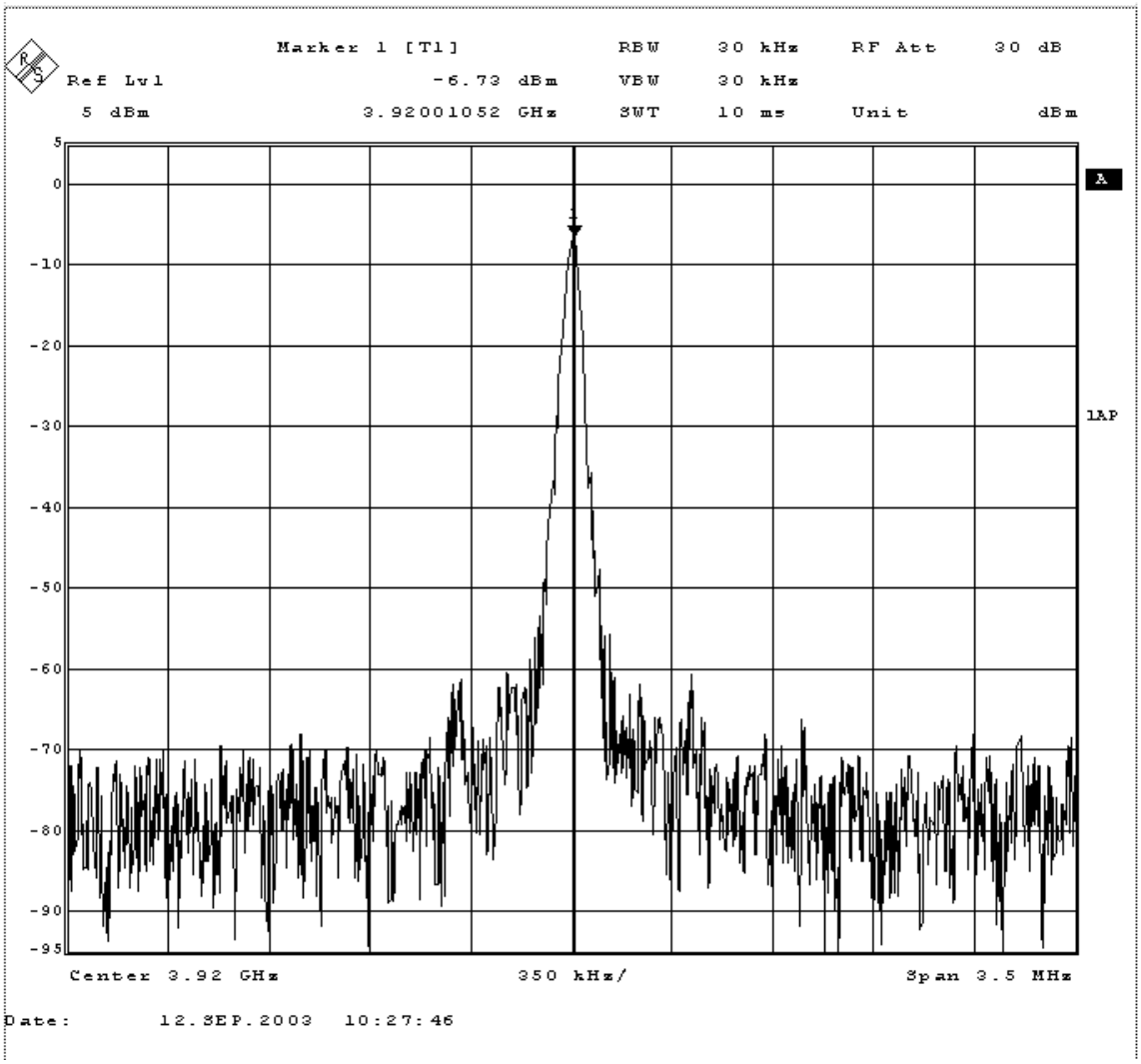
Figure 29: VCO output, 1800 band, ch700, RX on, continuous output



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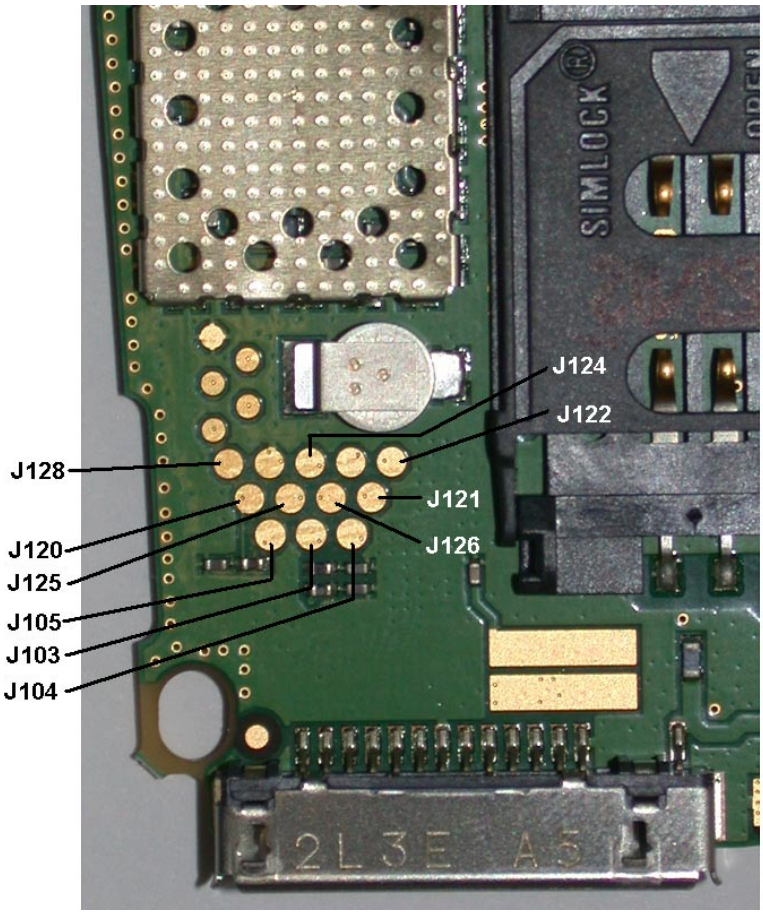
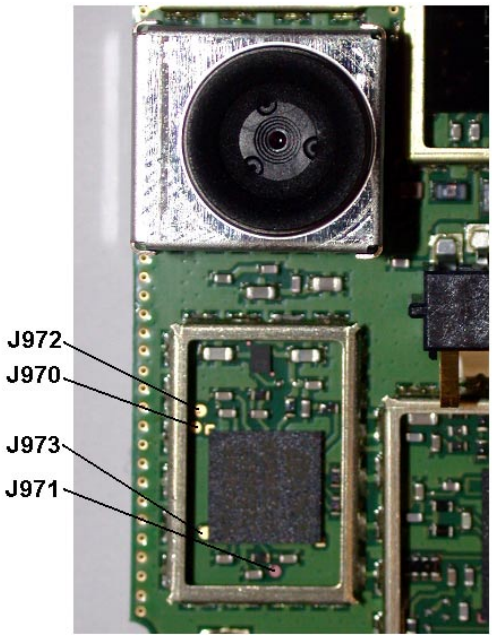
Baseband troubleshooting

Figure 1: Basic baseband test points





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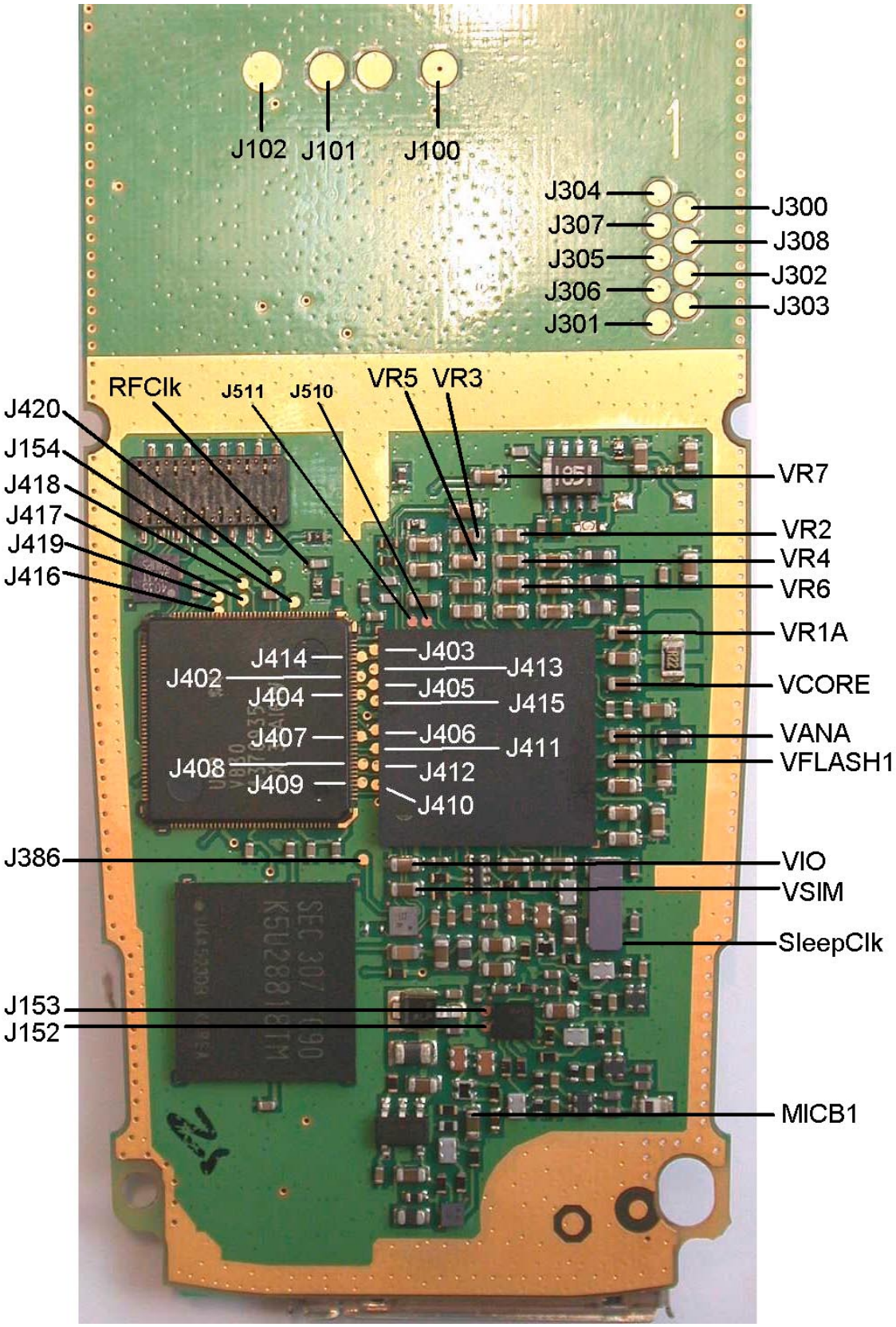

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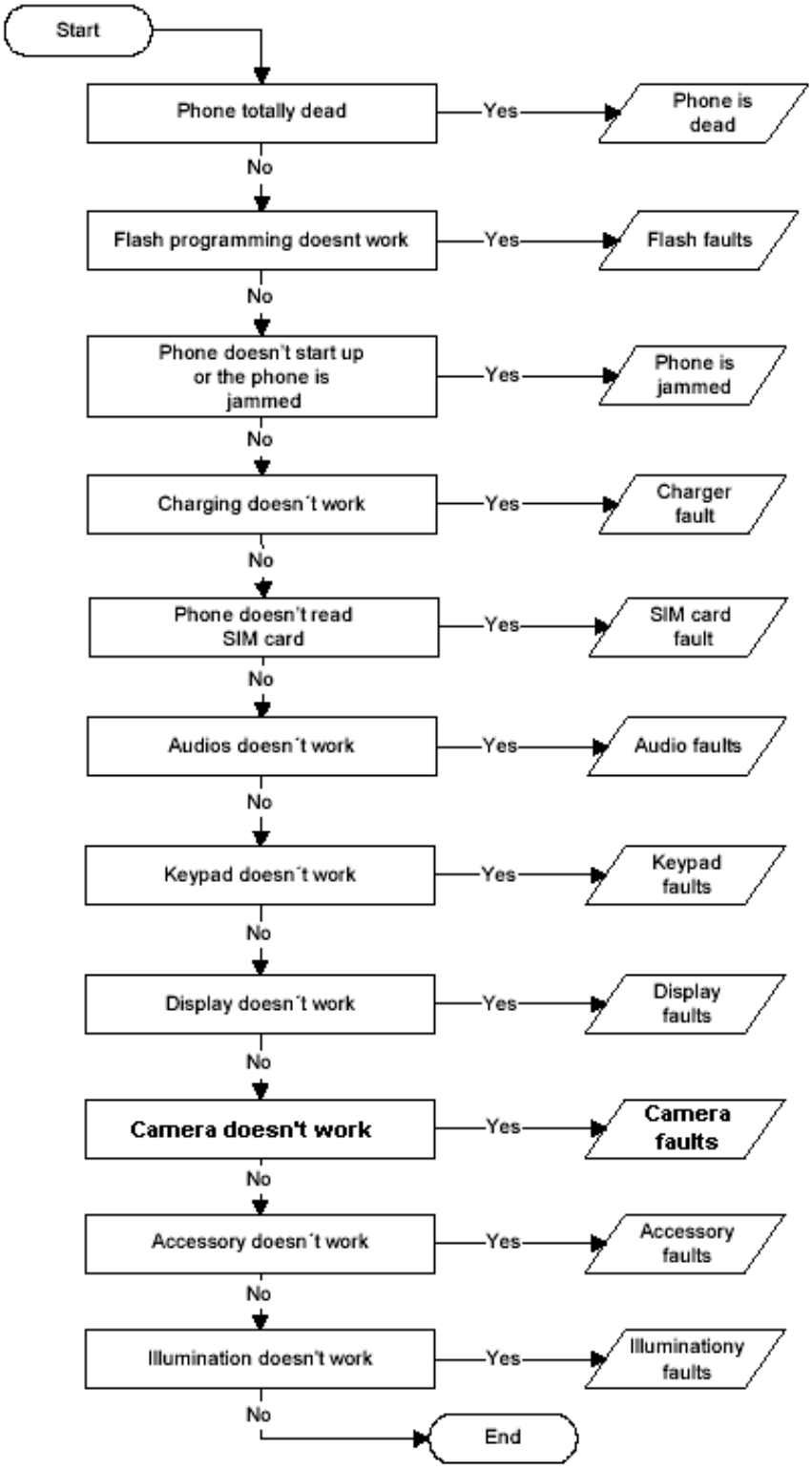
The following diagrams describe baseband troubleshooting.

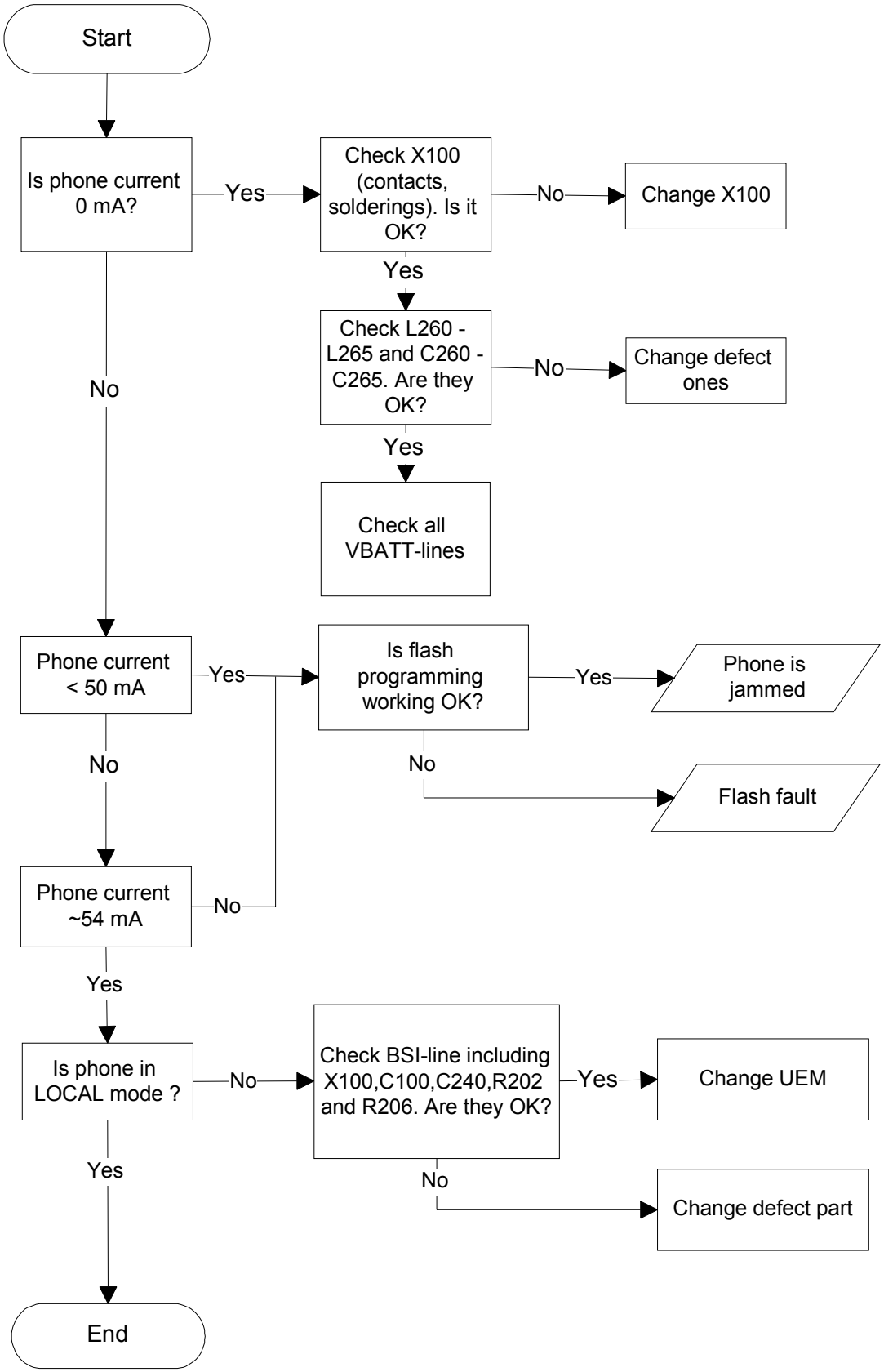
Main Troubleshooting Diagram

Figure 2: Baseband general troubleshooting



Phone is dead

Figure 3: Dead phone troubleshooting



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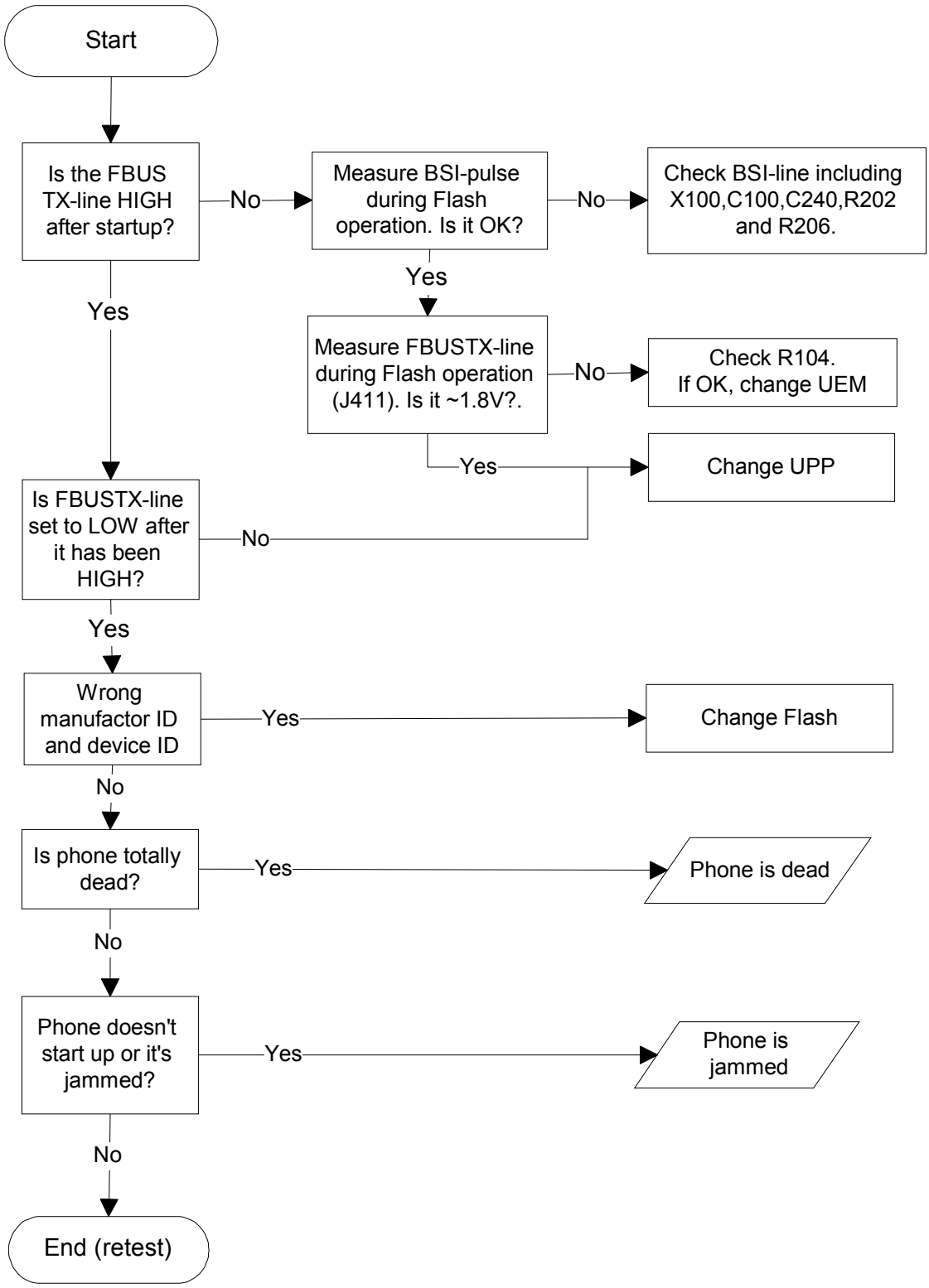
Flash Programming Fault

Figure 4: Flash programming troubleshooting



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Phone is jammed

Figure 5: Jammed phone troubleshooting (1)

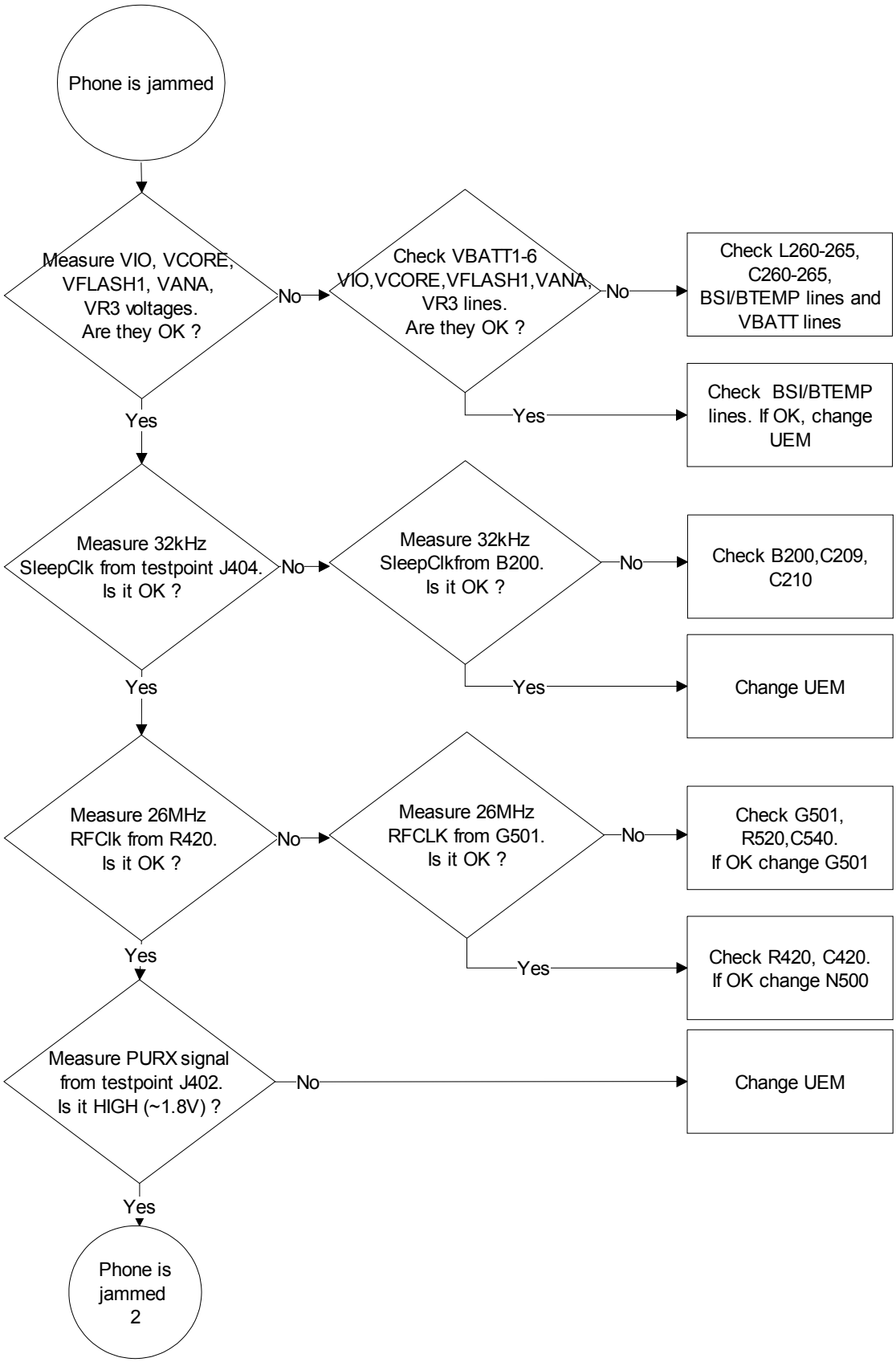
Phone is jammed
Measure VIO, VCORE, VFLASH1, VANA, VR3 voltages. Are they OK ?
No
Check VBATT1-6 VIO,VCORE,VFLASH1,VANA, VR3 lines. Are they OK ?
No
Check L260-265, C260-265, BSI/BTEMP lines and VBATT lines
Yes
Check BSI/BTEMP lines. If OK, change UEM
Yes
Measure 32kHz SleepClk from testpoint J404. Is it OK ?
No
Measure 32kHz SleepClkfrom B200. Is it OK ?
No
Check B200,C209, C210
Yes
Change UEM
Yes
Measure 26MHz RFClk from R420. Is it OK ?
No
Measure 26MHz RFCLK from G501. Is it OK ?
No
Check G501, R520,C540. If OK change G501
Yes
Check R420, C420. If OK change N500
Yes
Measure PURX signal from testpoint J402. Is it HIGH (~1.8V) ?
No
Change UEM
Yes
Phone is jammed 2

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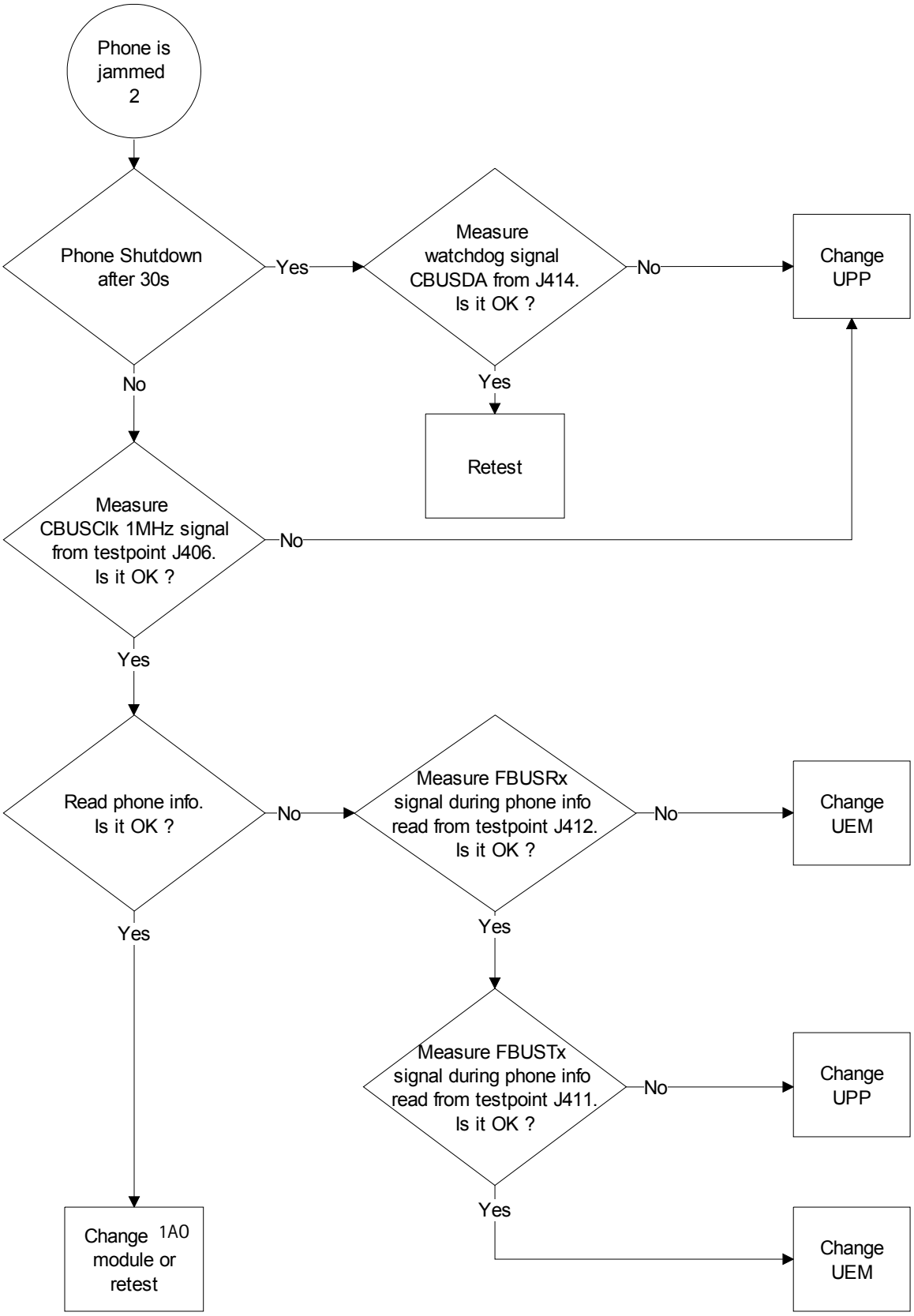
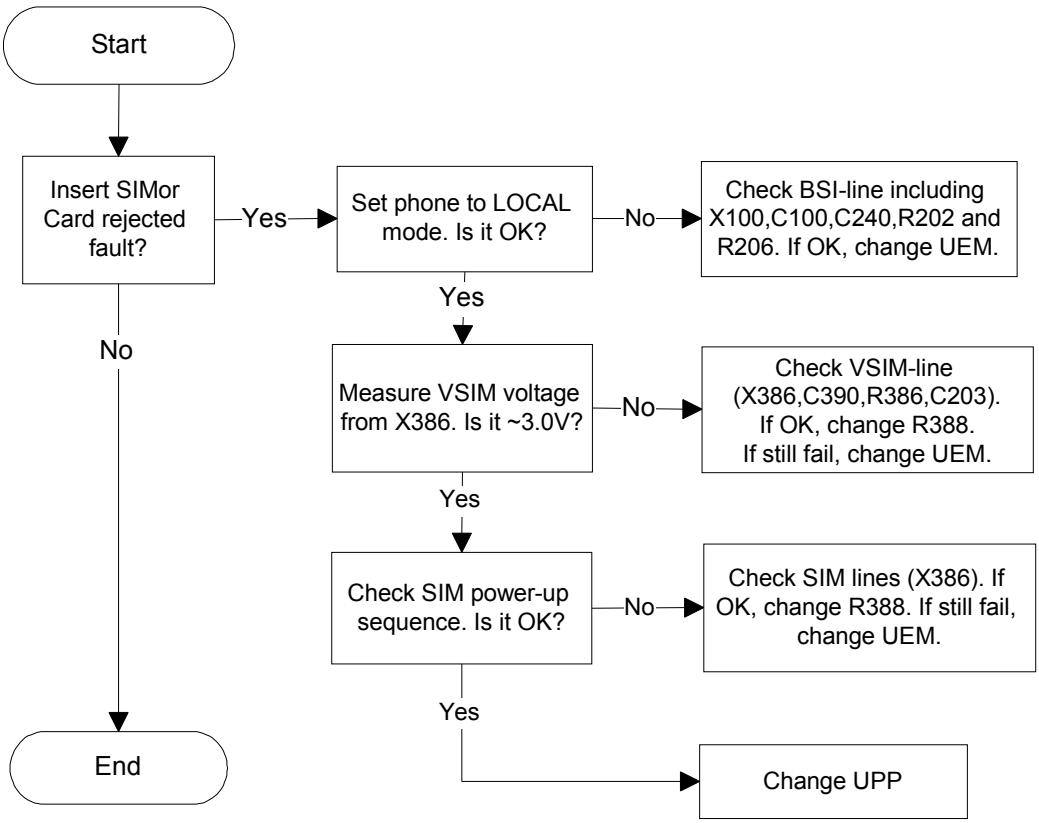
Figure 6: Jammed phone troubleshooting (2)



SIM card fault (Insert SIM / Card rejected)

Figure 7: SIM card troubleshooting


Start
Insert SIMor Card rejected fault?
Yes
Set phone to LOCAL mode. Is it OK?
No
Check BSI-line including X100,C100,C240,R202 and R206. If OK, change UEM.
Yes
No
Measure VSIM voltage from X386. Is it ~3.0V?
No
Check VSIM-line (X386,C390,R386,C203). If OK, change R388. If still fail, change UEM.
Yes
Check SIM power-up sequence. Is it OK?
No
Check SIM lines (X386). If OK, change R388. If still fail, change UEM.
Yes
End
Change UPP

Keypad Fault

Figure 8: Keypad troubleshooting (1)

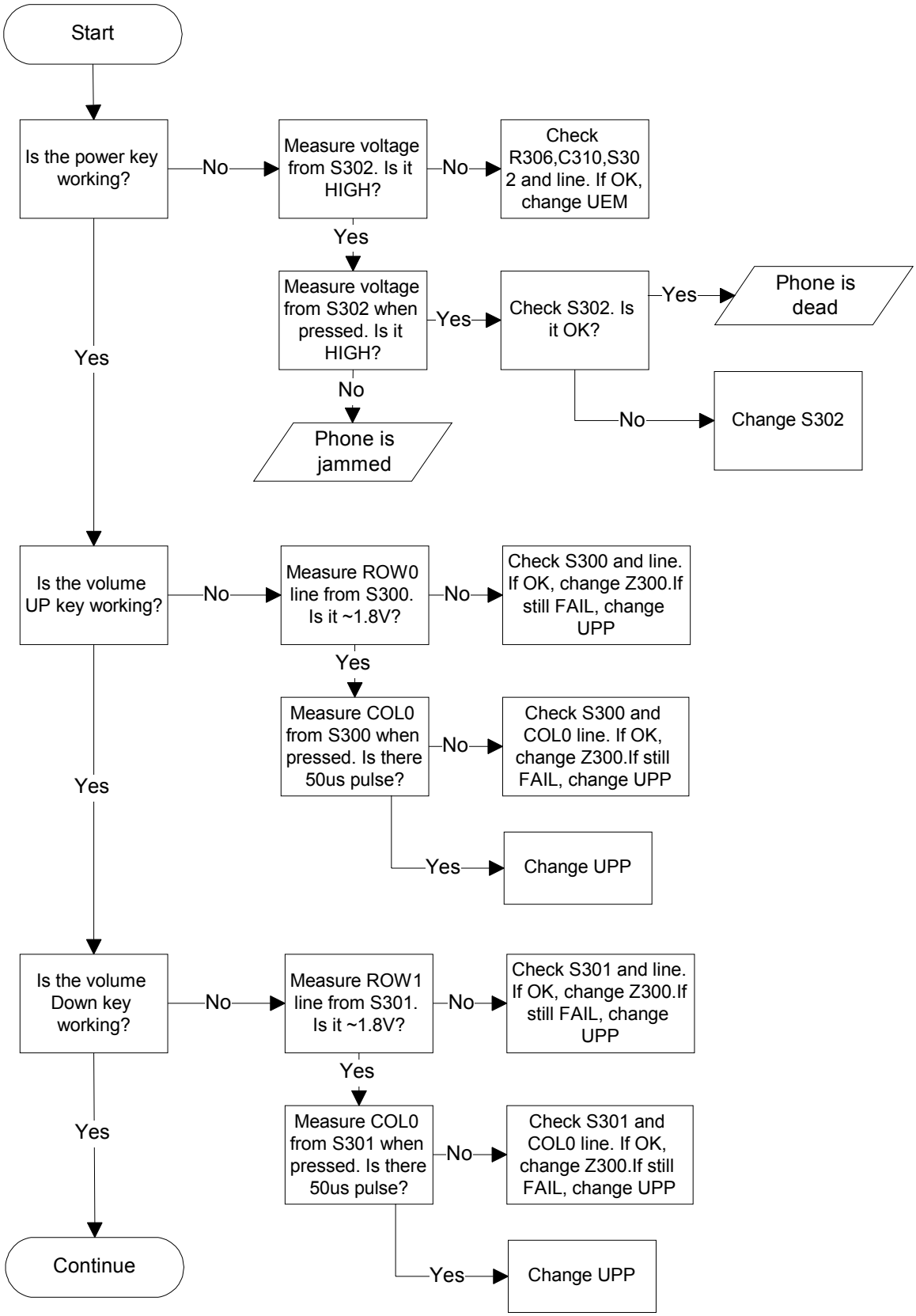
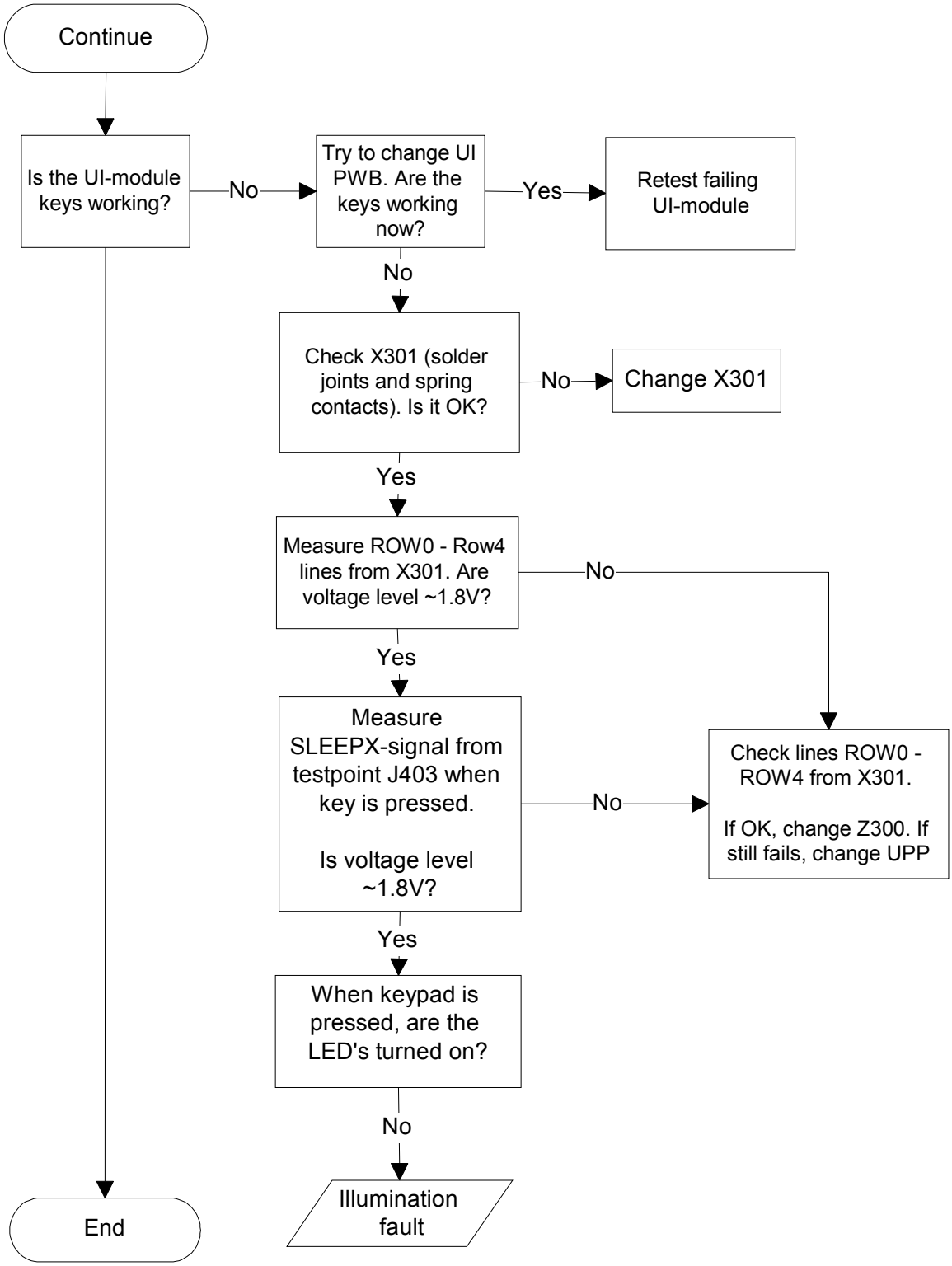
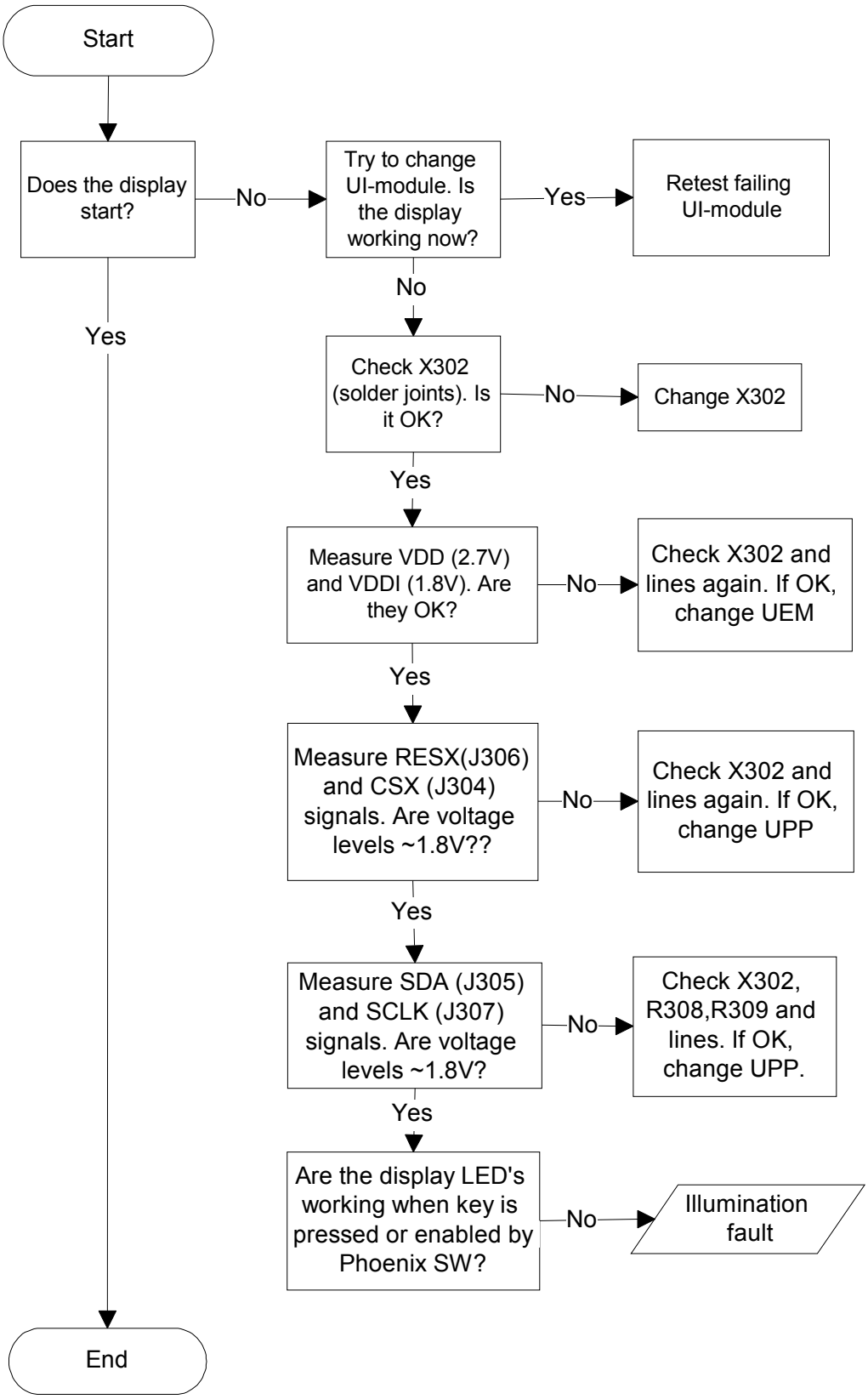

Start
Is the power key working?
No
Measure voltage from S302. Is it HIGH?
No
Check R306,C310,S302 and line. If OK, change UEM
Yes
Measure voltage from S302 when pressed. Is it HIGH?
Yes
Check S302. Is it OK?
Yes
Phone is dead
No
Change S302
No
Phone is jammed
Yes
Is the volume UP key working?
No
Measure ROW0 line from S300. Is it ~1.8V?
No
Check S300 and line. If OK, change Z300.If still FAIL, change UPP
Yes
Measure COL0 from S300 when pressed. Is there 50us pulse?
No
Check S300 and COL0 line. If OK, change Z300.If still FAIL, change UPP
Yes
Change UPP
Yes
Is the volume Down key working?
No
Measure ROW1 line from S301. Is it ~1.8V?
No
Check S301 and line. If OK, change Z300.If still FAIL, change UPP
Yes
Measure COL0 from S301 when pressed. Is there 50us pulse?
No
Check S301 and COL0 line. If OK, change Z300.If still FAIL, change UPP
Yes
Change UPP
Yes
Continue

Figure 9: Keypad troubleshooting (2)



Display Fault

Figure 10: Display troubleshooting


Start
Does the display start?
No
Try to change UI-module. Is the display working now?
Yes
Retest failing UI-module
No
Yes
Check X302 (solder joints). Is it OK?
No
Change X302
Yes
Measure VDD (2.7V) and VDDI (1.8V). Are they OK?
No
Check X302 and lines again. If OK, change UEM
Yes
Measure RESX(J306) and CSX (J304) signals. Are voltage levels ~1.8V??
No
Check X302 and lines again. If OK, change UPP
Yes
Measure SDA (J305) and SCLK (J307) signals. Are voltage levels ~1.8V?
No
Check X302, R308,R309 and lines. If OK, change UPP.
Yes
Are the display LED's working when key is pressed or enabled by Phoenix SW?
No
Illumination fault
End

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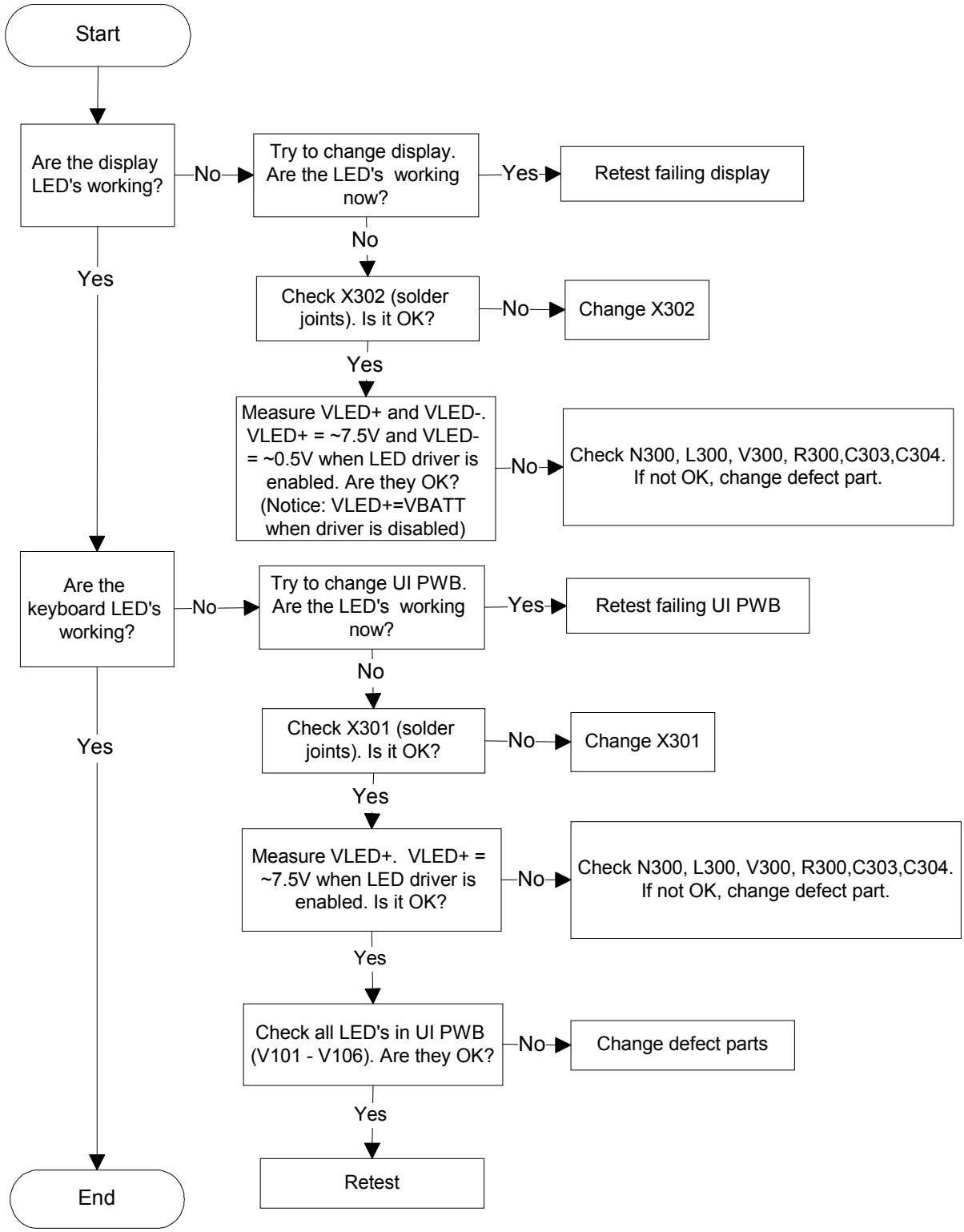
Illumination fault

Figure 11: Backlight troubleshooting


Start
Are the display LED's working?
No
Try to change display. Are the LED's working now?
Yes
Retest failing display
No
Yes
Check X302 (solder joints). Is it OK?
No
Change X302
Yes
Measure VLED+ and VLED-. VLED+ = ~7.5V and VLED- = ~0.5V when LED driver is enabled. Are they OK? (Notice: VLED+=VBATT when driver is disabled)
No
Check N300, L300, V300, R300,C303,C304. If not OK, change defect part.
Are the keyboard LED's working?
No
Try to change UI PWB. Are the LED's working now?
Yes
Retest failing UI PWB
No
Yes
Check X301 (solder joints). Is it OK?
No
Change X301
Yes
Measure VLED+. VLED+ = ~7.5V when LED driver is enabled. Is it OK?
No
Check N300, L300, V300, R300,C303,C304. If not OK, change defect part.
Yes
Check all LED's in UI PWB (V101 - V106). Are they OK?
No
Change defect parts
Yes
Retest
End

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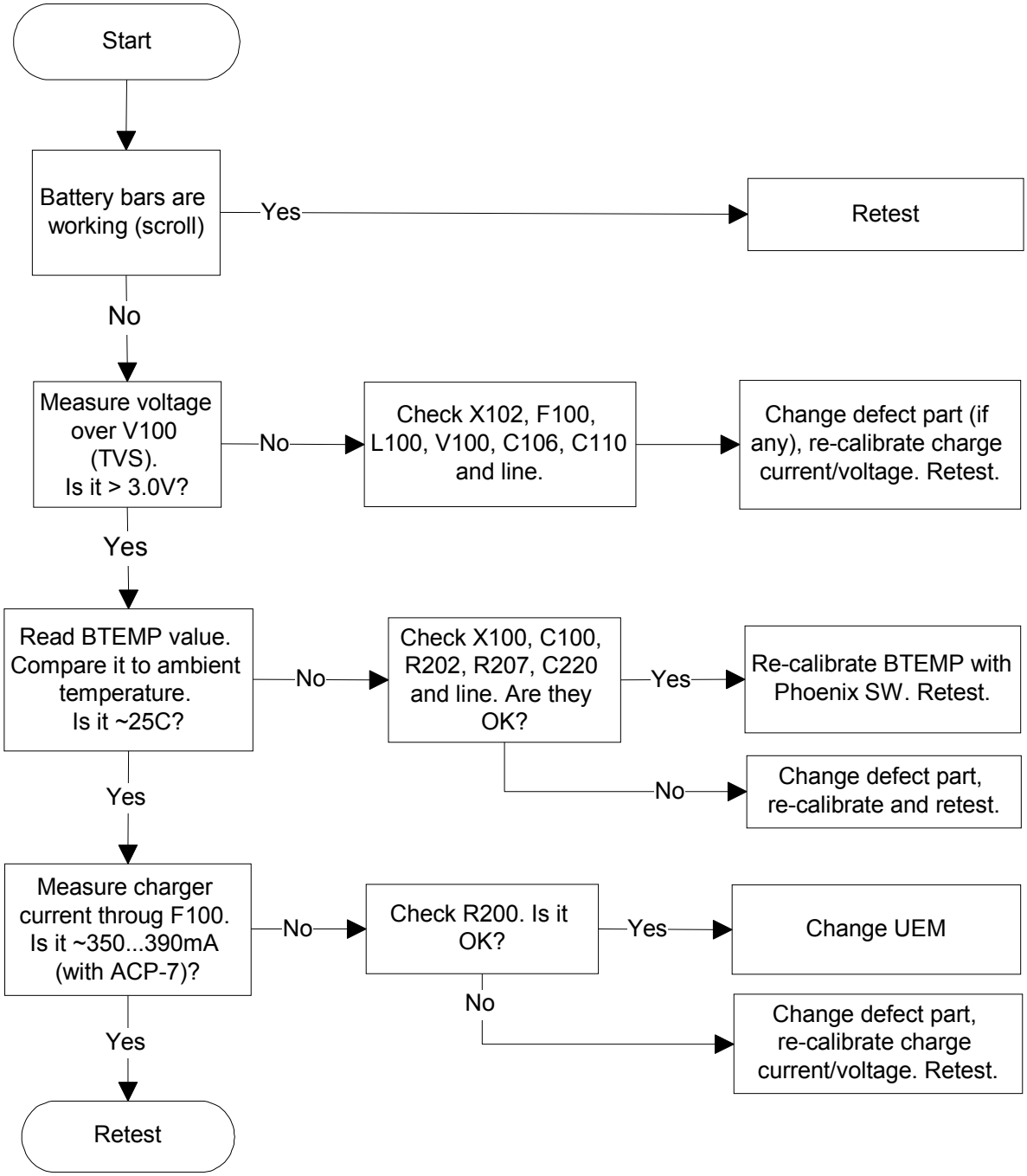
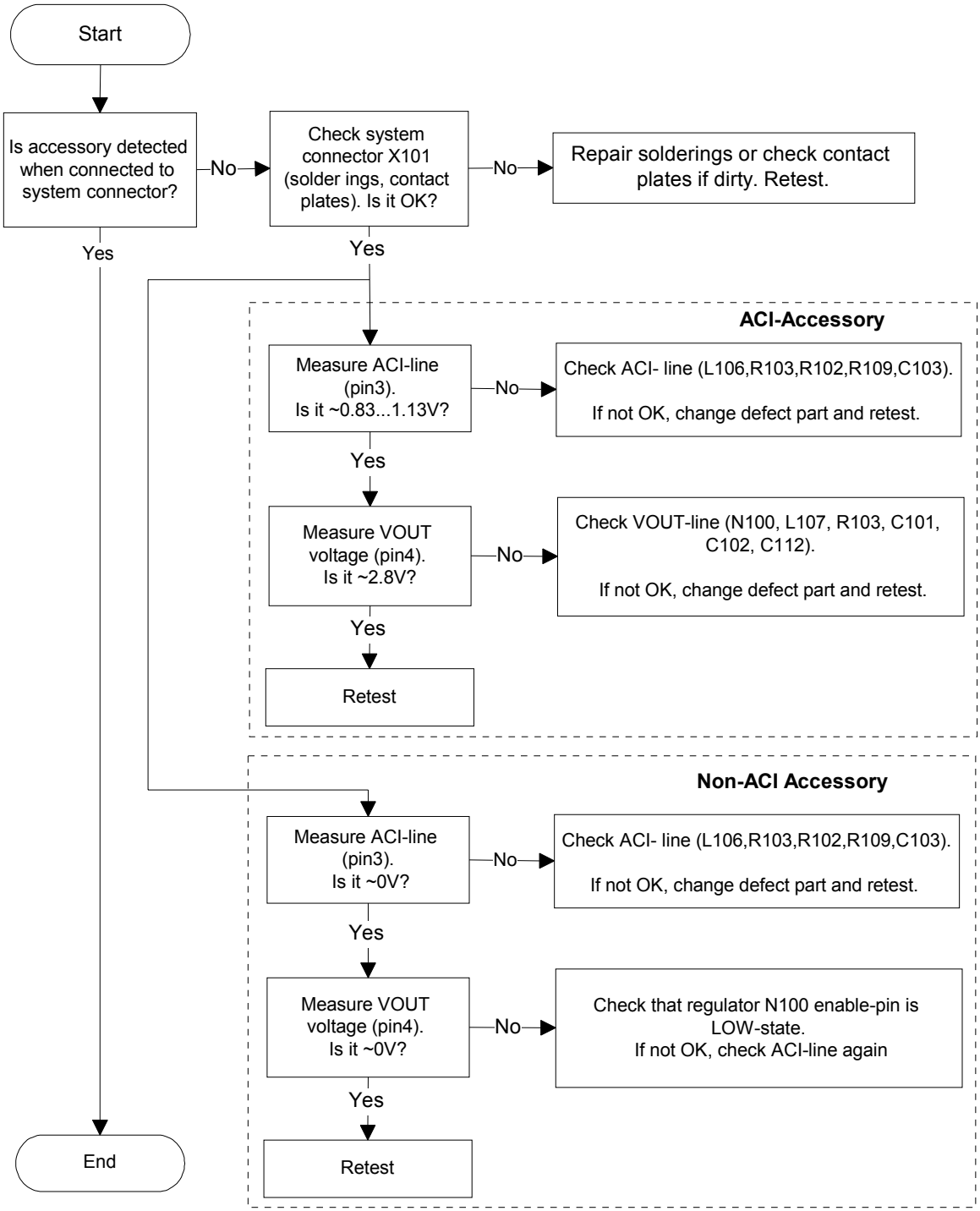
Charger Fault

Figure 12: Charging troubleshooting



Accessory Fault

Figure 13: Accessory troubleshooting



Audio Fault

Figure 14: Audio troubleshooting (1)

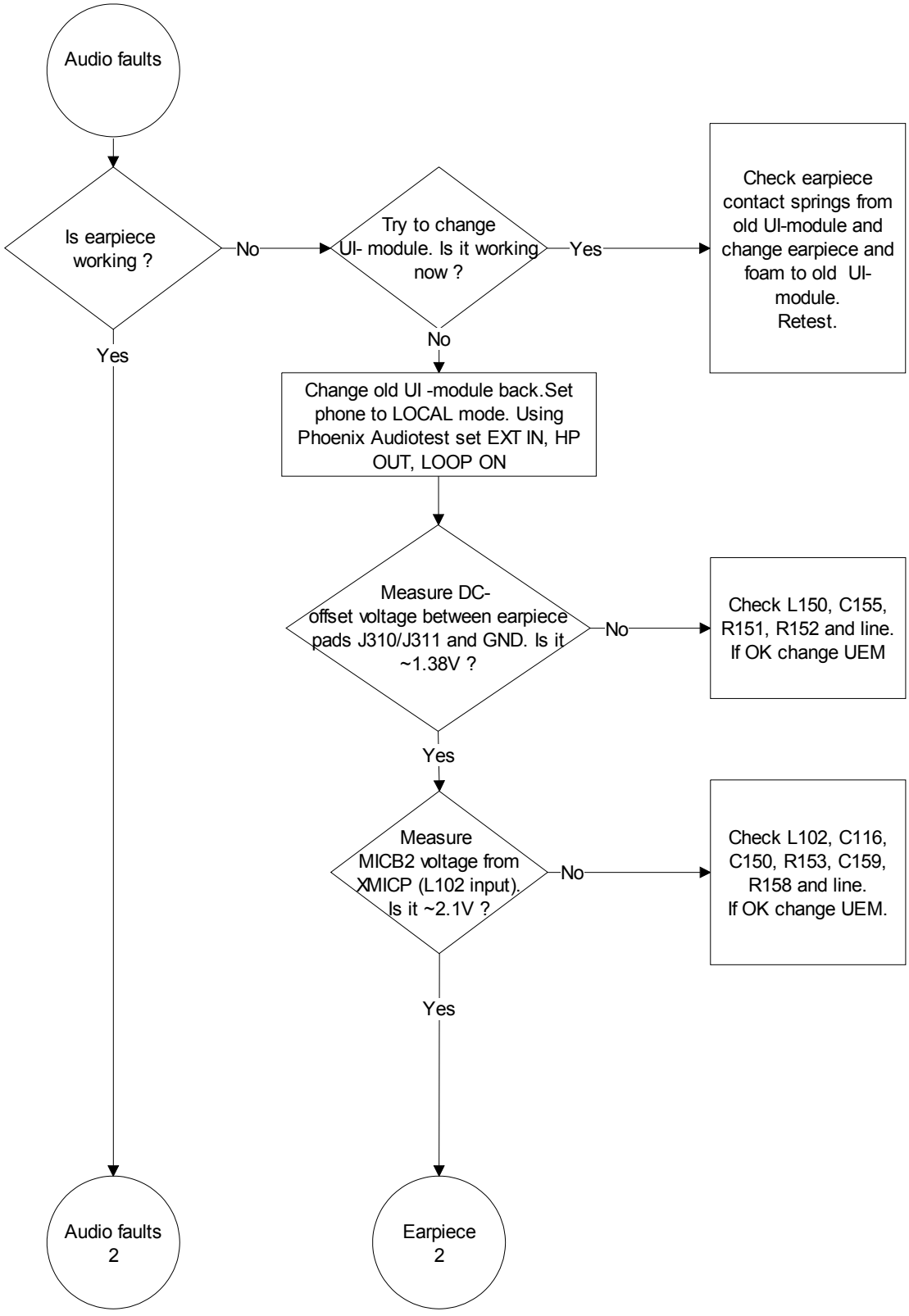

Audio faults
Is earpiece working ?
No
Yes
Try to change UI- module. Is it working now ?
Yes
No
Check earpiece contact springs from old UI-module and change earpiece and foam to old UI-module. Retest.
Change old UI -module back.Set phone to LOCAL mode. Using Phoenix Audiotest set EXT IN, HP OUT, LOOP ON
Measure DC-offset voltage between earpiece pads J310/J311 and GND. Is it ~1.38V ?
No
Check L150, C155, R151, R152 and line. If OK change UEM
Yes
Measure MICB2 voltage from XMICP (L102 input). Is it ~2.1V ?
No
Check L102, C116, C150, R153, C159, R158 and line. If OK change UEM.
Yes
Audio faults 2
Earpiece 2

Figure 15: Audio troubleshooting (2)

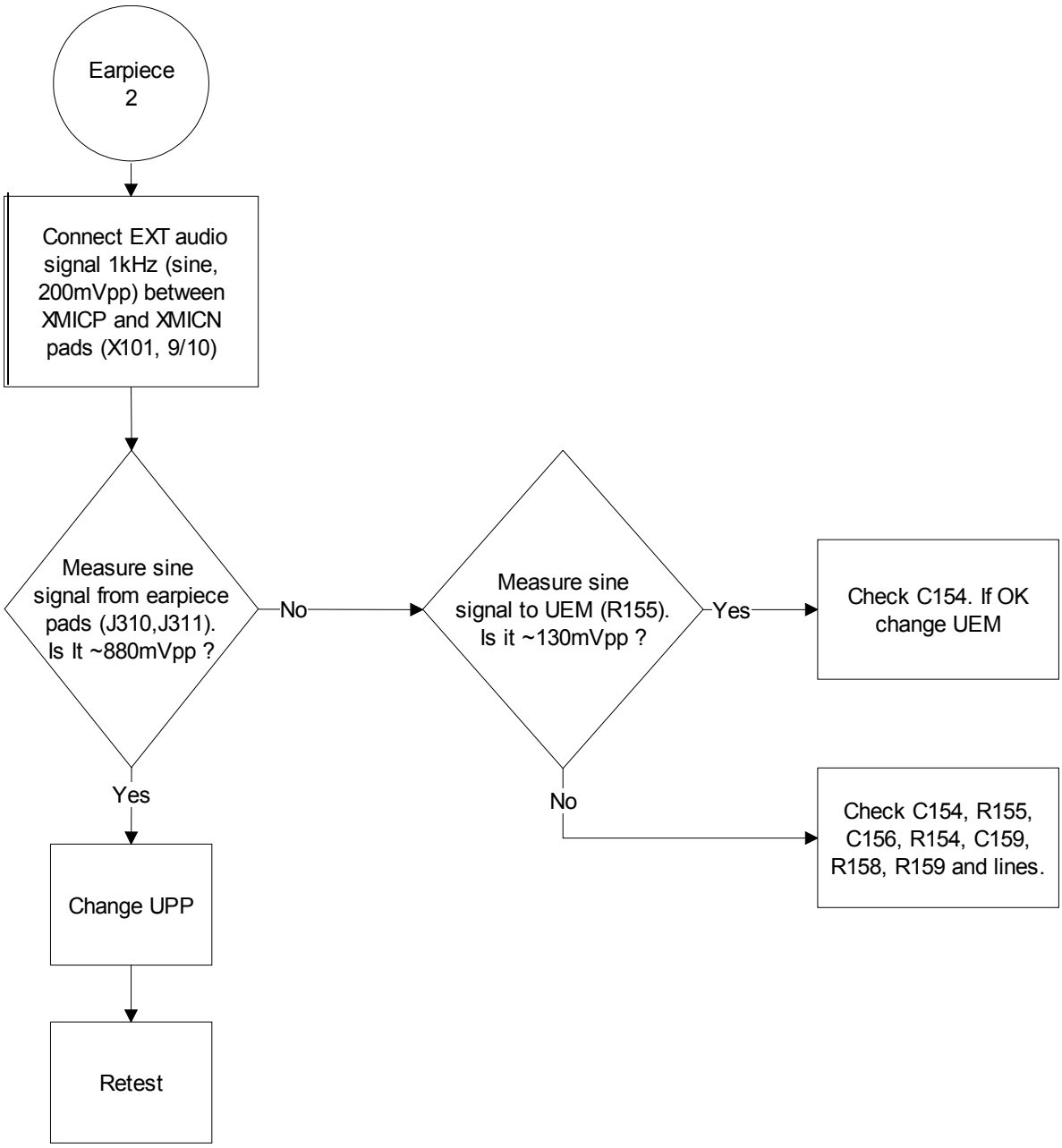

Earpiece 2
Connect EXT audio signal 1kHz (sine, 200mVpp) between XMICP and XMICN pads (X101, 9/10)
Measure sine signal from earpiece pads (J310,J311). Is It ~880mVpp ?
No
Measure sine signal to UEM (R155). Is it ~130mVpp ?
Yes
Check C154. If OK change UEM
Yes
Change UPP
Retest
No
Check C154, R155, C156, R154, C159, R158, R159 and lines.

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Figure 16: Audio troubleshooting (3)

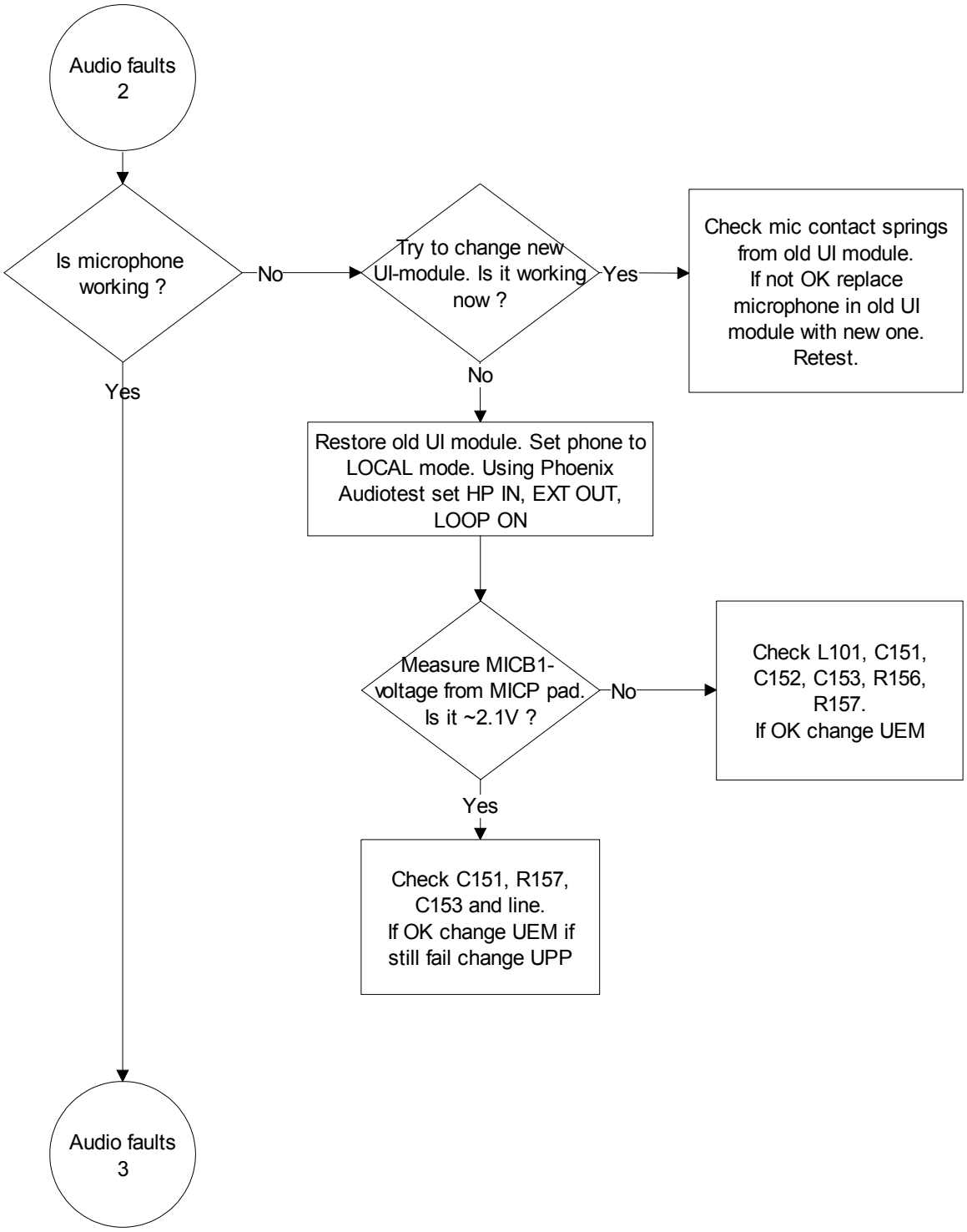
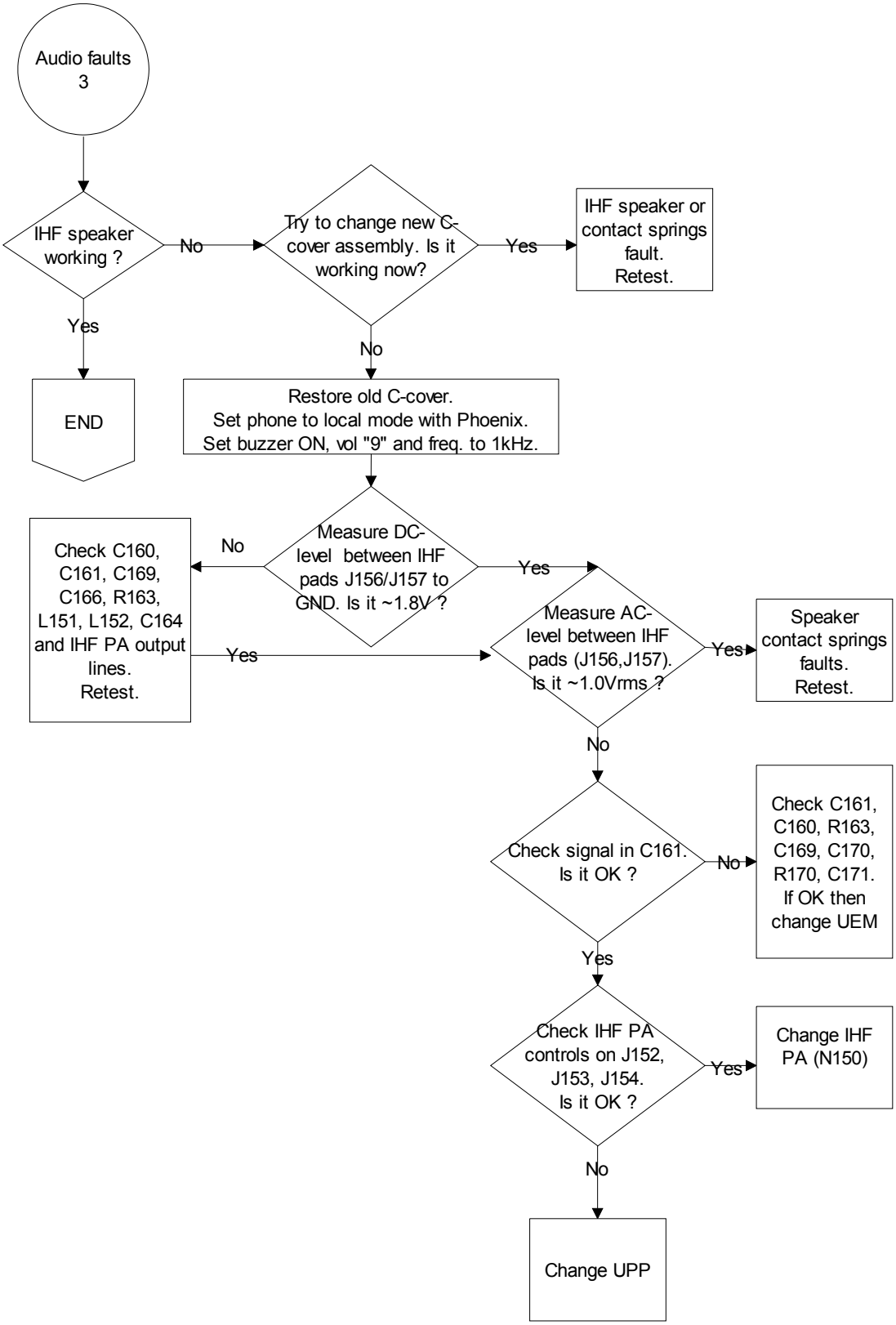

Audio faults 2
Is microphone working ?
No
Try to change new UI-module. Is it working now ?
Yes
Check mic contact springs from old UI module. If not OK replace microphone in old UI module with new one. Retest.
No
Yes
Restore old UI module. Set phone to LOCAL mode. Using Phoenix Audiotest set HP IN, EXT OUT, LOOP ON
Measure MICB1-voltage from MICP pad. Is it ~2.1V ?
No
Check L101, C151, C152, C153, R156, R157. If OK change UEM
Yes
Check C151, R157, C153 and line. If OK change UEM if still fail change UPP
Audio faults 3

Figure 17: Audio troubleshooting (4)


Audio faults 3
IHF speaker working ?
No
Try to change new C-cover assembly. Is it working now?
Yes
IHF speaker or contact springs fault. Retest.
Yes
END
No
Restore old C-cover. Set phone to local mode with Phoenix. Set buzzer ON, vol "9" and freq. to 1kHz.
Measure DC-level between IHF pads J156/J157 to GND. Is it ~1.8V ?
No
Check C160, C161, C169, C166, R163, L151, L152, C164 and IHF PA output lines. Retest.
Yes
Yes
Measure AC-level between IHF pads (J156,J157). Is it ~1.0Vrms ?
Yes
Speaker contact springs faults. Retest.
No
Check signal in C161. Is it OK ?
No
Check C161, C160, R163, C169, C170, R170, C171. If OK then change UEM
Yes
Check IHF PA controls on J152, J153, J154. Is it OK ?
Yes
Change IHF PA (N150)
No
Change UPP

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Camera Troubleshooting

Figure 18: Component placement

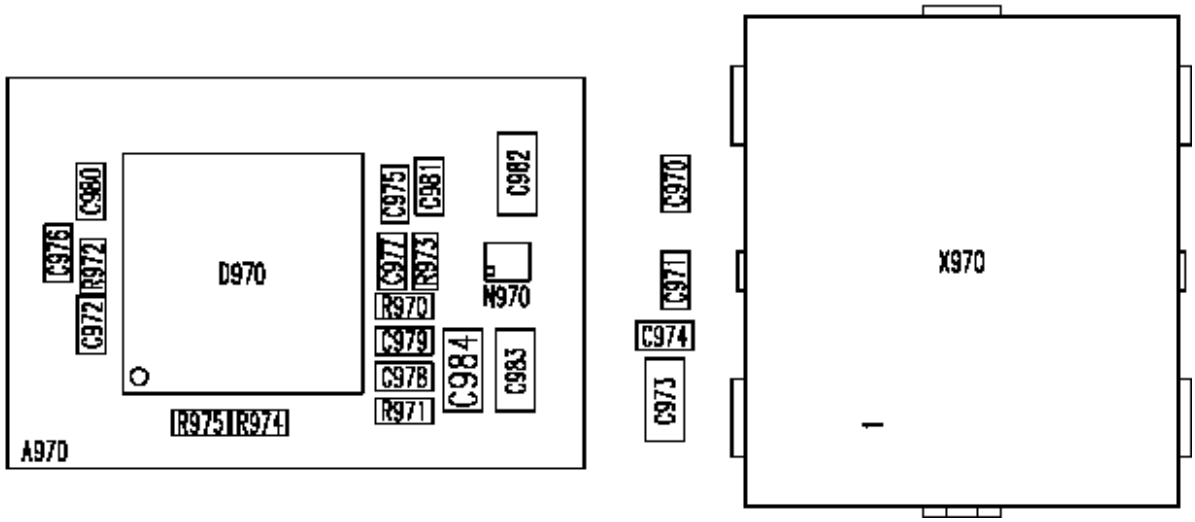
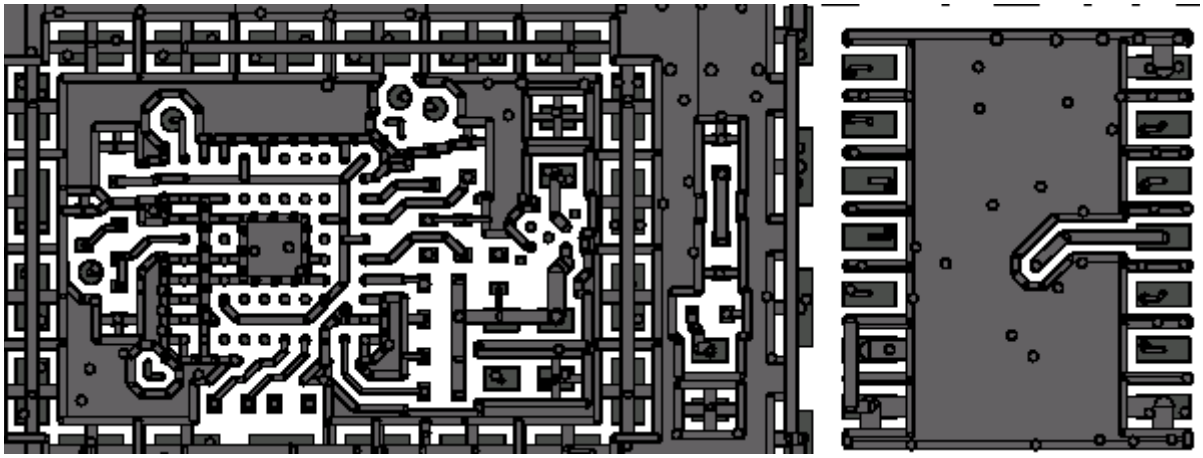
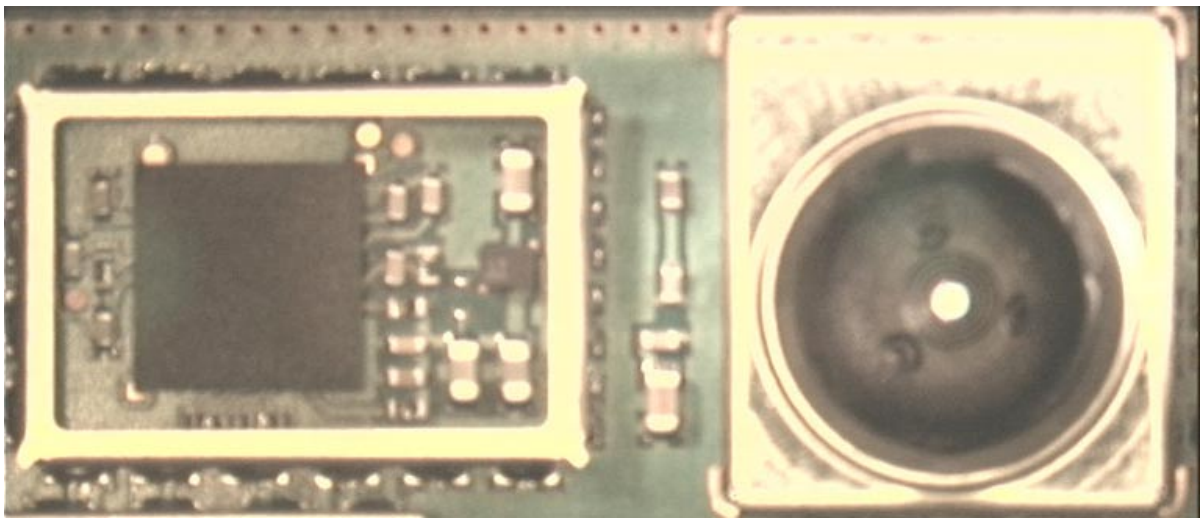


Figure 19: Trace layout





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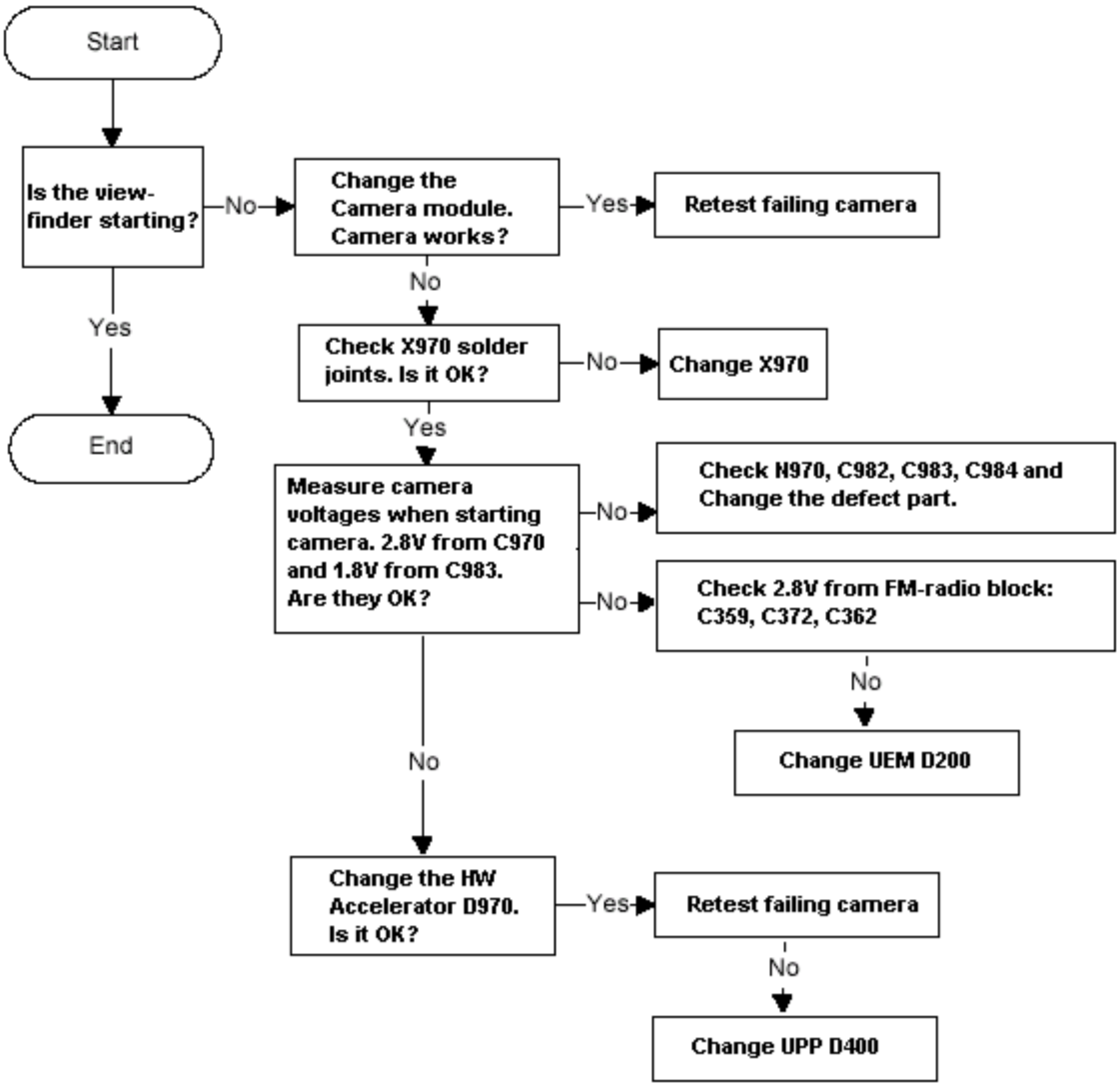
Camera Fault

Camera troubleshooting diagram



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FM Radio troubleshooting

Figure 20: FM Radio Component layout

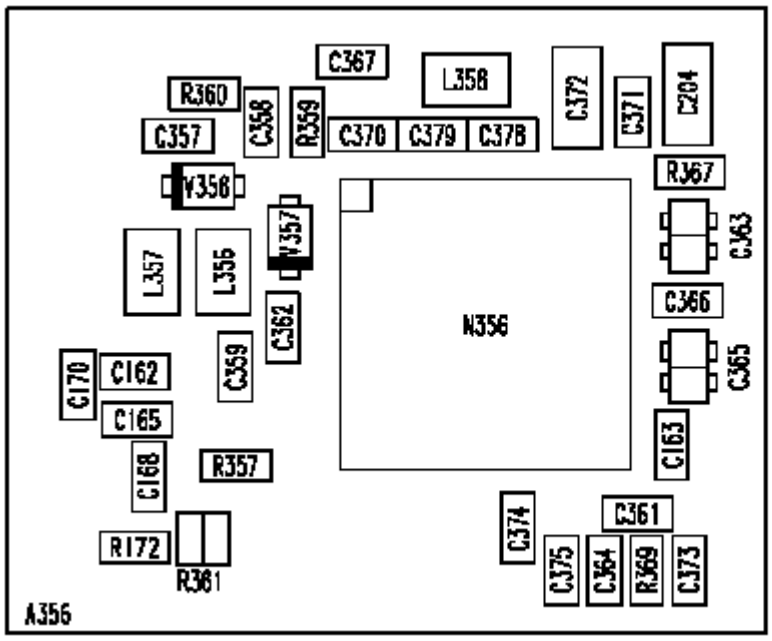

Figure 21: Trace layout.

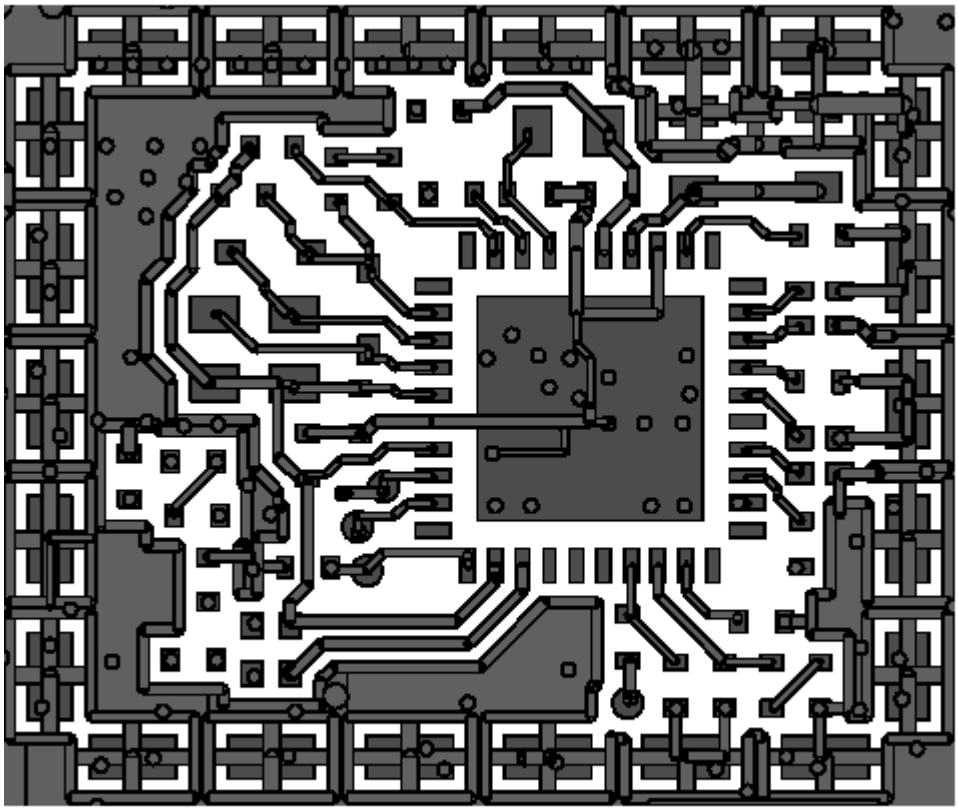

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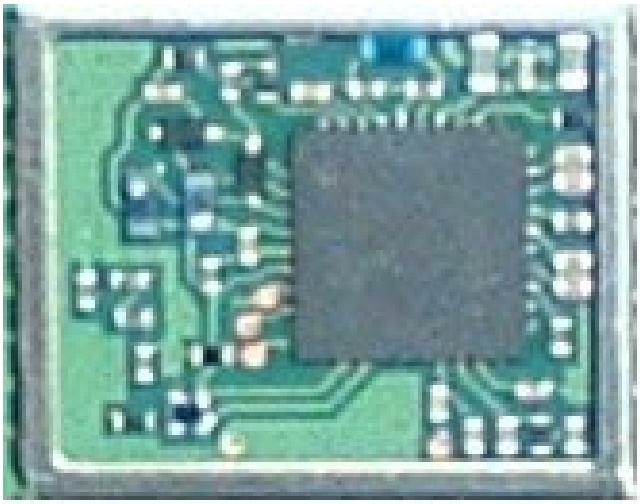
Figure 22: FM radio block layout.



Components L103, L104, L105, C107, C108, C109, C117, C162, C163, R164, R165, R166 and R167 are not shown in the picture. Those components are placed in baseband section, near audio amplifier N150.

FM Radio troubleshooting diagram

Notes to "FM Radio troubleshooting diagram"

Use 1MHz 1X probe when measuring Audio and clock signals with oscilloscope.

Use active RF probe when measuring frequencies with spectrum analyzer.

Note 1. RF test signal parameters:

- Amplitude, *A*, –67.0 dBm
- Carrier frequency, f_c, 98,000 MHz
- Deviation, Δf, 75 kHz
- Modulating frequency f_m, 1,000 kHz (RF generator internal)
- FM stereo, mode R=L, pilot state ON

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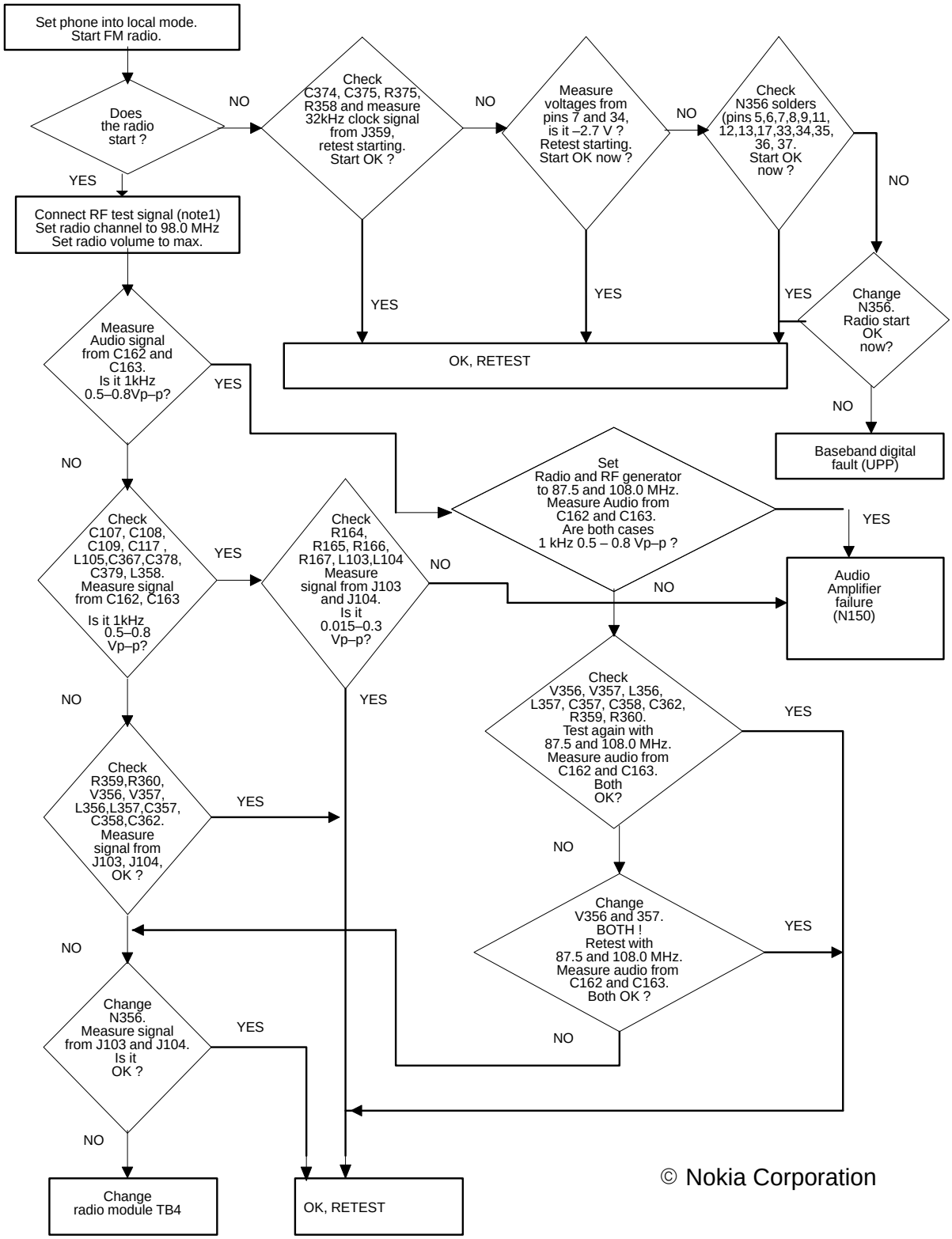
Figure 23: FM radio troubleshooting diagram


Set phone into local mode.
Start FM radio.
Does the radio start ?
NO
Check C374, C375, R375, R358 and measure 32kHz clock signal from J359, retest starting. Start OK ?
NO
Measure voltages from pins 7 and 34, is it –2.7 V ? Retest starting. Start OK now ?
NO
Check N356 solders (pins 5,6,7,8,9,11, 12,13,17,33,34,35, 36, 37. Start OK now ?
NO
YES
Connect RF test signal (note1)
Set radio channel to 98.0 MHz
Set radio volume to max.
YES
YES
YES
Change N356. Radio start OK now?
OK, RETEST
NO
Baseband digital fault (UPP)
Measure Audio signal from C162 and C163. Is it 1kHz 0.5–0.8Vp–p?
YES
NO
Set Radio and RF generator to 87.5 and 108.0 MHz. Measure Audio from C162 and C163. Are both cases 1 kHz 0.5 – 0.8 Vp–p ?
YES
Audio Amplifier failure (N150)
NO
Check C107, C108, C109, C117, L105,C367,C378, C379, L358. Measure signal from C162, C163 Is it 1kHz 0.5–0.8 Vp–p?
YES
Check R164, R165, R166, R167, L103,L104 Measure signal from J103 and J104. Is it 0.015–0.3 Vp–p?
NO
NO
YES
Check V356, V357, L356, L357, C357, C358, C362, R359, R360. Test again with 87.5 and 108.0 MHz. Measure audio from C162 and C163. Both OK?
YES
NO
Check R359,R360, V356, V357, L356,L357,C357, C358,C362. Measure signal from J103, J104, OK ?
YES
Change V356 and 357. BOTH ! Retest with 87.5 and 108.0 MHz. Measure audio from C162 and C163. Both OK ?
YES
NO
NO
Change N356. Measure signal from J103 and J104. Is it OK ?
YES
NO
Change radio module TB4
OK, RETEST
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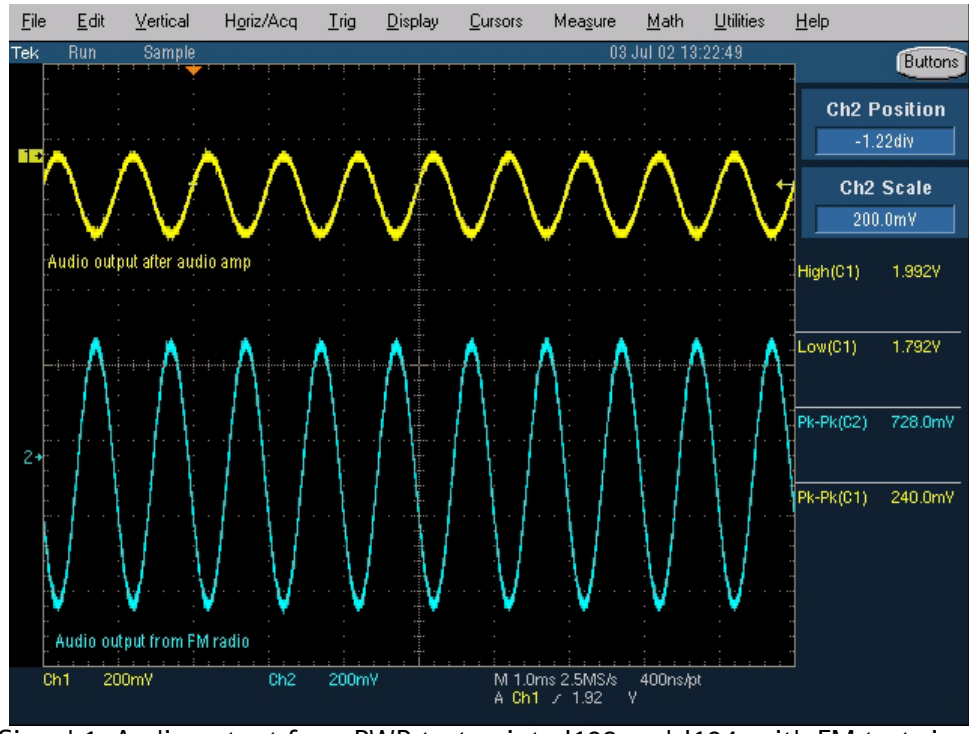
Diagrams of FM radio signals

Figure 24: Oscilloscope screen shot, Audio output



Signal 1: Audio output from PWB test points J103 and J104, with FM test signal, volume 100%.

Signal 2: Audio output from FM radio pins 22 and 23(same as in C162 and C163), with FM test signa

Figure 25: FM radio clock from test point J359, 32 kHz frequency clock signal, when radio is on.l

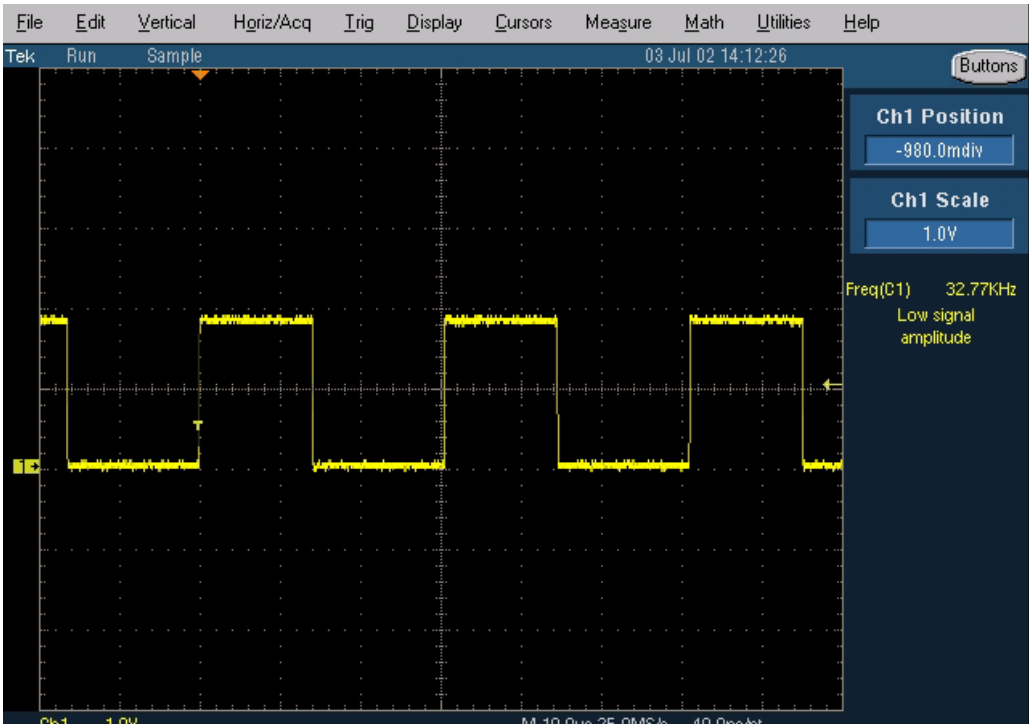


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Figure 26: FM frequency from FM radio pin 37, the other end of L358, with FM test signal

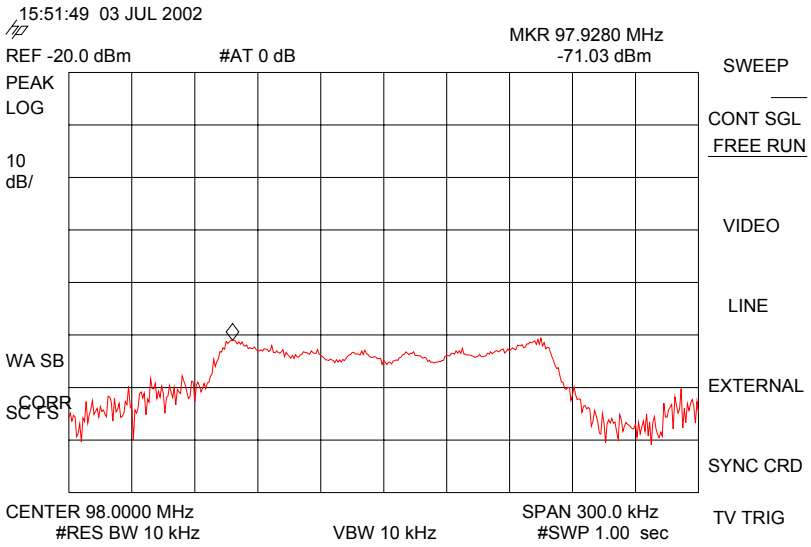
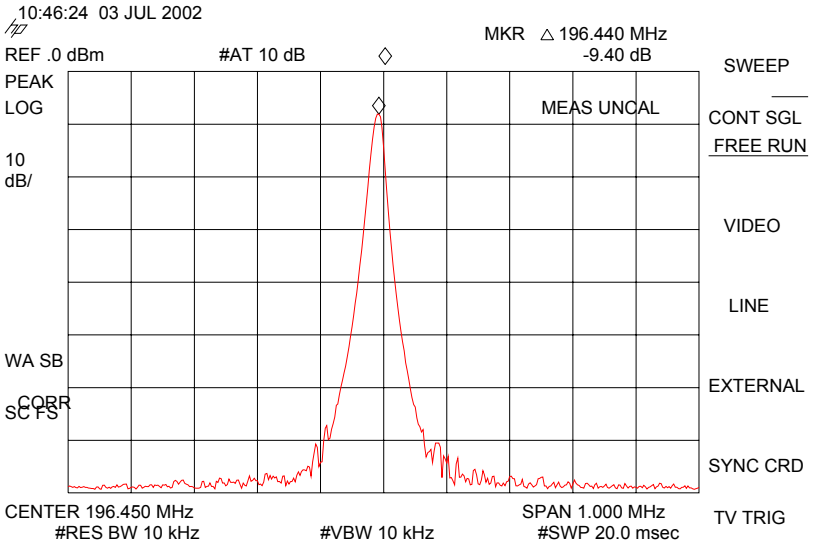


Figure 27: VCO frequency from FM radio pins 3 and 4, the other ends of V356 and V357, with FM test signal



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